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Motivation to Conduct Research in a Rapidly Evolving Academic Environment: A Study of Coimbatore's Engineering Institutions

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Motivation to Conduct Research in a Rapidly Evolving Academic Environment: A Study of Coimbatore's Engineering Institutions

By

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At last, to that 13 year old dreamer who never gave up wanting to be a researcher I say this

“You did it”!

Author's Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without the prior consent of the Graduate Committee.

Work submitted for this research degree at the University of Plymouth has not formed part of any other degree either at the University of Plymouth or at another establishment.

Papers and conferences related to the thesis by the author:

1. BAKTHAVATCHAALAM, V., MILES, M., MACHADO-TAYLOR, M. D. L. & GINGELE, J. 2018. Evolution of Coimbatore's Engineering Institutions: Current challenges and future directions. Higher Education in Central and Eastern Europe: National, Regional and European Trajectories. Budapest, Hungary: CEU.
2. BAKTHAVATCHAALAM, V. P., MILES, M., HORODNIC, I. A. & MACHADO-TAYLOR, M. L., 2017, Research Productivity of Higher Educational Systems in Transition: A Study of Engineering Institutions in Coimbatore, India. MISSION RESPONSIBLE: Future of Education and Youth Work, 30/11/2017 - 02/12/2017 2017b Athens, Greece.
3. BAKTHAVATCHAALAM, V. P., MILES, M., HORODNIC, I. A. & GINGELE, J. 2017. Influences of Cultural Identities on the Research Productivity of Academics: A Study of Engineering Institutions in South India. UNESCO's World Humanities Conference, 06-12/08/2017 2017a Liege, Belgium. Liege: UNESCO.
4. BAKTHAVATCHAALAM, V. P., MILES, M., FOX, A. & GINGELE, J. 2015. Shifting the threshold of motivation theory to overcome local disquietudes in Coimbatore, India. V.C.'s conference. Plymouth, UK.
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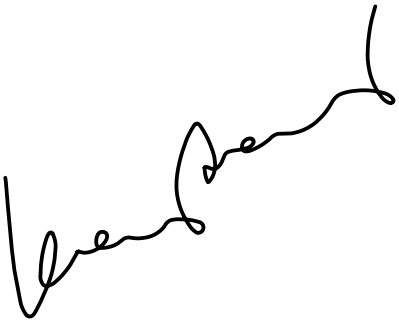

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Venkat Prakash Bakthavatchaalam

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Abstract:

The Indian academic system is in a period of rapid transition evidenced by the increasing number of Higher Education Institutions (HEIs), students and academics. However, very few studies have explored the Research Productivity (RP) of the academics and the various factors influencing them. Even those few studies have largely ignored the influences of indigenous factors and academic dishonesty on the RP of academics. This research explores how different factors influence the academic RP in South Indian engineering institutions founded after 1990.

This study uses a mixed method approach. Quantitative data was collected from a sample of 307 engineering academics working in fifty-seven engineering institutions in South India. This was used to measure the current state of RP and the various factors that influence it. Qualitative data was collected using semi-structured interviews to help understand the interconnections between those factors and the changing academic environment. Results were analysed with tests of association, differences, factor analysis, weighted Least Square regression and TOBIT regression. Interview data was analysed based on content analysis.

The results show that indigenous factors play a major role in motivating the academics to conduct research whereas corruption / academic dishonesty, thought to be prevalent at all levels in the Higher Educational System tends to reduce their research motivation. The analysis also revealed challenges faced by the academic system and its failure to achieve its research potential. The research found how factors such as Elements of Cultural Identities, Academic Dishonesty and Changing Academic environment are interconnected and how these interconnections influenced academics' RP.

Based on the results the research offers suggestions on increasing the RP of the academics and decreasing the academic dishonesty at various levels thus informing future HE policy making.

Contents

List of Figures:

List of Tables:

List of abbreviations:

AD – Academic Dishonesty
API – Academic Performance Indicators
CFA – Confirmatory Factor Analysis
DV – Dependent Variable
EFA – Exploratory Factor Analysis
EoCI – Elements of Cultural Identity
EoRP – Elements of Research Productivity
FA – Factor Analysis
IIEP – International Institute for Education Planning
IV – Independent Variable
K-W H – Kruskall Wallace H test
MDG – Millennium Development Goals
MHRD – Ministry of Human Resource Development
MI – Multiple Imputation
ML – Maximum Likelihood
NIRF - National Institutional Ranking Framework
OCS – Overall Conference Score
OPS – Overall Paper Score
ORP – Overall Research Productivity
OSS – Overall Supervision Score
PCA – Principle Component Analysis
RM – Research Motivation
RP – Research Productivity
SDG – Sustainable Development Goals
SEM – Structural Equation Modelling
UNESCO – United Nations Education Scientific and Cultural Organisation

Chapter 1: Background of the study:

The Indian Higher Education System (HES) is rapidly evolving in terms of the size of the sector, its educational policies, the needs of its Higher Education Institutions (HEI) and the changing culture of the society it serves. In the last 17 years alone, the number of Higher Educational Institutions (HEI) have increased by 205%, the number of enrolled students by 311% and the number of staff by 269% UGC (2017).

In spite of all these changes there have been very few empirical studies conducted to inform policy making and understand how they impact on the various elements of HES including its academics. Whilst there is a gamut of research available on primary, secondary and adult education teachers' motivation see (Saigal, 2012, Ramachandran et al., 2005) there has been very little research conducted on motivation in HEI.

The role of the academics in HEIs is increasing in complexity as they take on more responsibility in terms of teaching, research and administrative duties (Krause, 2009). The roles of the academics are also influenced by the national culture they live in, the academic environment, the type of department they work in and the type of HEIs that employs them etc. with all factors having an influence on the RP of the academics (Nguyen, 2015).

As shown by Horodnic and Zait (2015) and Akinyokun and Uzoka (2007) the productivity of the academics is correlated to their motivation and they are the key resource for research at the institutions. They play a crucial role in the institutions achieving their goals and having a motivated work force is essential to increase the RP of the academics (Rowley, 1996).

However Tien (2007) comments that despite being motivated the academics might not be very successful in their jobs if they do not have the required competencies or if the

academic environment where they work is in an unfavourable condition. So, it becomes important to conduct research and to understand the various factors beyond simple motivation that influence the RP of the academics.

A review by Bakthavatchaalam et al. (2013) revealed very few studies conducted in this area. The review found that no study has looked at the influence of the rapidly changing academic environment or academic dishonesty on the research productivity of the academics. The review found no genuine attempts to create new models using qualitative methods.

Most of the research that do exist, quantitatively measure, rank and test the data using theories developed predominantly in the Western countries. In addition, none of the studies had explicitly studied how Elements of Cultural Identities (EoCI) influence the quantity and the quality of the research conducted. This suggests that the practices chosen as a result might not be suited to the rapidly developing and culturally different scenario found in India. The importance of cultural differences and their impacts on people's work values and behaviour are discussed by Hofstede (1984). With Khatri et al. (2012) commenting that new management practices should be developed in India based on the local needs.

Research Productivity (RP) is the sum of all the various research activities conducted and published by the academics including supervision of students, national and international conferences, papers published, chapters and books authored, patients registered etc. (Abramo and D'Angelo, 2014, Ramsden, 1994, Zamarripa, 1993). RP has become an essential indicator to measure the performance of an academic, a department and the institution as a whole. RP is also an important measure used when applying for funding for the institution, for determining the distinction of the academic and the institution and for national and international rankings. This shows the importance of conducting research and publishing.

In addition, the importance of conducting quality research and publishing in the current academic system cannot be overemphasised, with Zhang (2014) commenting on the benefits of research include helping to produce critical thinkers, generate public wealth and support the society.

Thus, it becomes essential to identify and evaluate the various factors that influence the RP of the academics. As seen from the following literature, an academic's motivation to conduct research and publish is influenced by a complex array of factors. These include their demographics (Subramanian and Nammalvar, 2017, Kyvik and Olsen, 2008), personal and professional factors (Horodnic and Zait, 2015, Agarwal, 2006b, Brocato and Mavis, 2005), institutional / organisational factors (Carayol and Matt, 2006, Mairesse and Turner, 2002, Dundar and Lewis, 1998), and governing bodies and policies (Carvalho and Diogo, 2017, Diogo, 2015, Amaral et al., 2009). In addition, the changing academic environment (Rani, 2010) and the EoCI (Bakthavatchaalam et al., 2017a, Kaasa, 2016) also influences the RP of the academics. Most of the above studies were conducted in an international setting and it is essential to not only test the importance and applicability of these factors in an Indian setting quantitatively, but more importantly, it is essential to identify any factors that are indigenous to the Indian setting and to develop new models based on qualitative methods.

The Ministry of Human Resource Development (MHRD) of India has introduced the Academic Performance Indicator (API) scores and the (NIRF, 2015) framework for ranking the institutions. Research is an important element in achieving a high NIRF ranking, so the institutions are starting to push their academics to publish more. However, the literature shows that there have not been any studies especially looking into what factors, to what extent and how they influence the RP of the academics. The increase in the HES is mirrored in the increase of the engineering institutions in

Coimbatore, a South Indian city. Still, no research has explored the RP of the academics and the factors that influence them. Therefore, this study exploring the RP of the academics in India is not only important but also timely. The results from this thesis would be of use to the institutions and the governing bodies trying to form research policies.

1.1 Research questions:

This research is conducted to find answers for the following questions:

1. What are the dominant factors affecting the motivation and the research productivity of Coimbatore's engineering academics?
2. To what extent do demographic differences influence research productivity?
3. How do the Elements of Cultural Identities (EoCI) and Academic Dishonesty (AD) influence the research productivity of the academics?
4. What type of a framework should be developed for the HEIs to encourage the academics' productivity?

1.2 Specific aim of this research:

To identify and critically evaluate the various factors impacting Coimbatore's academics' motivation to increase their research productivity in a rapidly evolving academic environment.

1.3 Objectives:

1. Undertake a literature review and Identify the various factors that influence the motivation to publish and the research productivity of academics
2. To evaluate the main factors identified and to produce a conceptual framework that may be used to assess the research productivity and motivation in South Indian academics.

3. Apply the framework in Coimbatore's engineering institutions and test its effectiveness to identify factors that that may be particularly relevant to the rapidly changing South Indian academic environment
4. Refine the assessment tool and to produce a framework that can be applied in the South Indian academic system to increase the RP.

1.3 Overview of the chapters:

The thesis is structured conventionally as shown in fig.1: starting with the aims and objectives, literature review, need for research, formulation of a conceptual model, methodology and data collection, results, analysis and conclusion.

Chapter 1 will define the research questions along with the aims and objectives of the research.
In addition, chapter 1.4 gives the background and context in which the research takes place.

Section 1.4.1 will discuss the Indian Higher Education system and the concerns being raised at various levels within it. The section will present a statistical overview of the rapidly expanding HE sector in India. It will look at the different types of HEIs and the privatisation of HE and the increase in the number of engineering institutions.

1.4.2 Will look at the various concerns in the HE system in India. It will discuss the concerns at different levels: i.e. relating to Governing bodies and National policies, at institutional level and at academic level. Concerns regarding Academic Dishonesty (AD) / corruption and the effects of the declining quality of HE are also discussed.

1.4.3 Will provide an overview of the engineering institutions in Coimbatore, the demographics of the institutions and the various characteristics such as the number of courses offered, number of staffs, students and the PhDs employed etc. This will be used to inform the selection of the target population for this research.

Chapter 2 will be the literature review. The literature is divided into the following sections.

2.1 This section will discuss the various, prominent motivational theories. The literature on motivational theories will be divided into two parts, the classical and the modern theories of motivation. The section will detail important classical theories such as Maslow's hierarchy, McClelland's theory and the two-factor theory etc. It will also discuss the modern motivational practices such as creativity theory, groups and culture theory.

2.2 This section will look at the current studies on academics' motivation to conduct research in India. A meta-analysis of the papers published on the topic in India will be reviewed.

2.2.1 Initially this section will look at Research Productivity (RP) of the academics and the various factors that influence it. It will consider the various determinants of RP including: demographic factors, personal, professional and organisational factors, AD and other factors and how they influence the RP. The identified factors will be used for formulating the conceptual model.

A scientometric analysis and a review of the secondary data will be conducted to identify the various characteristics of the literature, their area of focus, the theories they use and the methodologies etc. will be explored.

2.2.2 Based on the review, the gaps in literature, the need for research and contributions to knowledge will be identified.

Chapter 3 will discuss the methodology for data collection and the techniques used to organise and analyse that data.

3.1 Will include a detailed review of ontology, epistemology, methodology and methods for data collection. It will discuss the requirement for data collection to be done using systematic methods that are supported by sound research.

3.2 Will review aspects such as the research philosophy, the various types of methodologies for scientific and social enquiry, triangulation, reliability and repeatability, validity of data, sensitivity, target population, sampling size and sampling methods used. The researcher's standpoint concerning the research question, the methods of enquiry, the ethical element, and participant anonymity will also be described. 3.2 will also explain the methodology and analysis adopted for this research and justify the usage of the particular methods, design of the questionnaire; interviews and analysis techniques will be done.

3.3 This section will look at the various methods of measuring the (RP) of the academics and the method employed in this research with justifications.

Chapter 4 will discuss the various results from the questionnaires and the interviews. The chapter will be divided into two sub chapters. The quantitative and qualitative results.

4.1 This sub-chapter will initially discuss how the data was coded, explore, and impute any missing data. It will justify the type of imputation used. Descriptive analysis will be done to look at the demographics of the respondents. Tests of

differences and associations will be done to identify the relation between Overall Research Productivity (ORP) and the different demographic variables. This will be followed by exploratory factor analysis, which will be used for regression. Separate regressions will be conducted for the various Elements of Research Productivity (EoRP) that make up the ORP. An additional analysis will be conducted to look at the influence of any deleted variables on the ORP.

4.2 Will present results from the quantitative data that will be used to inform the qualitative research. The various interviews will be described and responses from the target population will be detailed.

Chapter 5 will be the discussions chapter which will be based on both the quantitative and qualitative results. This will discuss the results and the implications of these results based on the current literature. This chapter will also show if the results have met the aims and objectives of the research and if the research questions have been answered. In addition, the contribution to knowledge will be discussed in detail alongside recommendations for the Indian HE institutions. This may well be of use to HE institutions in other developing countries.

5.1 Explores the influence of demographic factors on the RP of the academics

5.2 Explores the influence of AD, Elements of Cultural Identities (EoCI) and the evolving academic environment on the RP of the academics.

5.3 Explores how the various factors influence the EoRP. Also frameworks for ORP and EoRP will be developed.

Chapter 6 will be the conclusion Chapter. It will summarise the findings and shall complete the thesis with references to follow. This chapter will discuss the limitations of the study and the future works based on this research.

There are several appendices at the end of all the chapters which are related to the various chapters discussed above. The overview of the chapters is shown in Fig.1

Fig.1: Overview of the chapters:

Source: Author.

1.4 Context / Background of the research:

Chapter 1.4 looks at the context in which the research is being conducted. In order to understand the background of the research, it explores the Indian HE system in three sections. The first section looks at some of the statistics on the Indian HES, followed by some of the well documented concerns in the HES. The last section explores the demographics of the engineering HEIs in Coimbatore.

1.4.1 An overview of the Indian HES:

This section gives an overview of the various statistics and the characteristics of the HES in India, its rapid increase in numbers and its evolution.

1.4.1.1 Introduction:

In order to understand the Indian HES that produces 2.5 million students a year (UGC-Report, 2017), this section of the literature will provide overviews of the HES in India, the types of Higher Education Institutions (HEIs) and the rapid increase in the number of institutions, especially the increase in South India. The terms used in this research for the various HEIs are based on AISHE (2017a) and is seen in table 2.

Table 2: Terms used in this research for various HEIs:

Term	Types of institutions included
University	Central University, Deemed University – Government and Private, Central and State Open University, Institution under State Legislature Act, Institution of National Importance, State Private and public University, State Private Open University and Deemed University-Government Aided.
Colleges	Affiliated and Constituent College, Post Graduate and off Campus Centre and Recognised Centre
Stand-alone institutions	Diploma Level Technical Institutes, Nursing, Teacher Training Institutes, Post-graduate diploma institutes and Institutes directly under the control of various Central Ministries.

Source: Author, based on AISHE (2017a)

This section will also discuss the impact of the growth in the number of institutions and consequently the quality of the education they provide. The section will conclude with the issues faced by the HE institutions and lead to a review of Coimbatore's engineering institutions and, based on this, how the target population of this research study will be selected.

In this thesis, the term 'HEIs' and institutions are used generically to refer to all the categories of Universities and colleges. Standalone institutions are not considered in this research and are not a part of the target population. The classification of HEIs based on various factors is given in section 1.4.1.4.

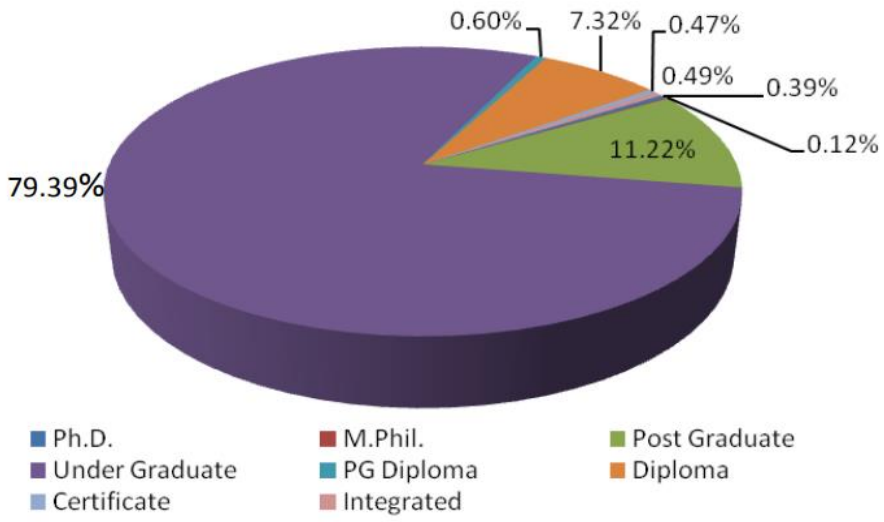
1.4.1.2 Statistics on the Indian higher educational system:

This section gives a few statistics on the current (2016-17) Indian HE system.

1. There are more than 35.7 million students enrolled in HE (AISHE, 2017a), which is roughly half the population of the UK (ONS, 2017). Girls constitute 46.8% of the students.
2. In total, there are 864 Universities, 40,026 Colleges and 11,669 Standalone Institutions. In total there are 52,559 HEIs in India, with 59.3% of the HEIs in rural areas. 77.8% of the institutions are privately owned (AISHE, 2017a).
3. HE in India is governed by the University Grants Commission (UGC) (UGC-Report, 2017, UGC, 2012) and the All India Council for Technical Education (AICTE) which is exclusively for technical education (AICTE, 2017a)
4. Tamil Nadu, a south Indian state ranks 7th in the number of colleges in the country, with Uttar Pradesh topping the list. In terms of cities, Bangalore has 1025 colleges overall.

5. 15 Universities are exclusively for women with 4 of them in Rajasthan and 2 in Tamil Nadu. There are 117 dual mode Universities offering both regular and distance education, with Tamil Nadu having 17 of them.
6. Of India's 29 states and 7 Union Territories (UT), just the three Southern states of Tamil Nadu, Andhra Pradesh and Kerala and the union territory of Pondicherry (UT), accounts for 45% of the HE institutions, showing major disparity between these four and the rest of the country as seen from AISHE (2017a), AICTE (2013b) and UGC-Report (2010).
7. The highest student enrolment is in Uttar Pradesh followed by Tamil Nadu and Maharashtra.
8. In terms of the student enrolment, 89.5% of them are enrolled on UG courses (See fig.2) , with around 10% of them enrolled on Masters or PG certificate courses and less than 0.16% of them enrolled in research level (M.Phil, and PhD) degrees (AISHE, 2017a).

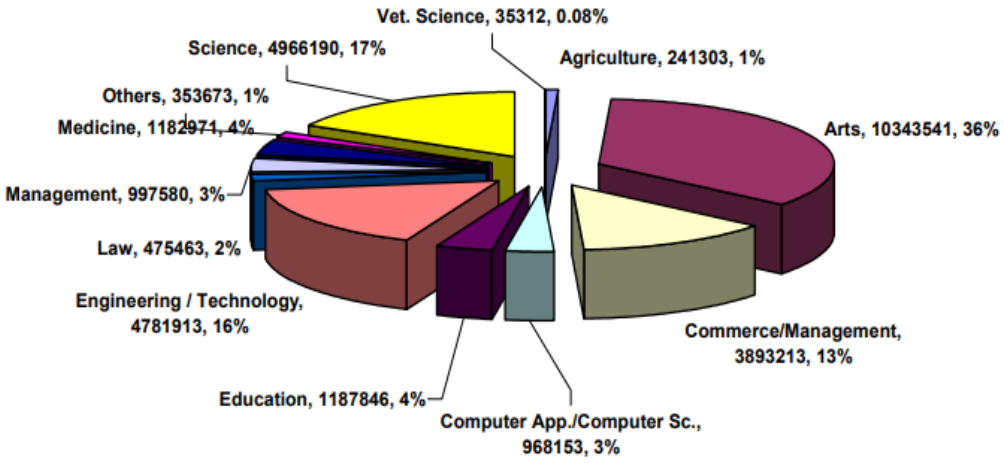
Fig.2: Level wise enrolment in 2016-17:



Source: AISHE (2017a)

9. 141,037 students are enrolled for a PhD both full-time and part-time. In 2016-17, a total of 28,779 students were awarded PhD level degree with 16,274 males and 12,505 females (AISHE, 2017a).
10. Engineering and technology has 32,865 students enrolled for PhD making it the second highest enrolment for PhD students. It is second only to Science with 37,363 PhD enrolments.
11. The overall distribution of student enrolment according to discipline can be seen in fig.3. At the Undergraduate level, 36% of students are enrolled in Arts/Humanities/Social Sciences courses. This is followed by 17% in Science with Engineering and Technology at 16% and Commerce at 13% (UGC-Report, 2017, AISHE, 2017a).

Fig.3: Faculty wise student enrolment in 2016-17:



Source: AISHE (2017a)

12. The number of colleges per lakh (hundred thousand) of population in the age group of 18-23 varies widely, from only 7 in Bihar to 59 in Telangana, with the national average being 28 (AICTE, 2018).

13. There are 1,365,786 HE academics, out of which 59.4% are male and 40.6% are female. The Student to teacher ratio in HE is 22:1 (AISHE, 2017a).
14. In terms of engineering and technology institutions: Tamil Nadu leads with 1025 institutions, with an intake capacity of 526,042 and 271,770 enrolled students. This is an important point to note as it shows both the scale of engineering education in Tamil Nadu and also that only 51% of the available seats are filled (AICTE, 2017a).
15. Of Tamil Nadu's engineering institutions, more than 87% are private HEIs (AICTE, 2017a).
16. In terms of academics, 70% of them are assistant professors (The entry level position in any HEI), with 13% associate professors and 10% professors (AISHE, 2017a). The remaining 7% comprises of tutors, technicians, visiting and emeritus professors. Nationally, 40.6% of the academics are female and, in the Engineering HEIs in Tamil Nadu, 35% of the academics are female.

This section has presented data to demonstrate the enormity of the HE system in terms of number of students, staff and institutions and their classifications.

1.4.1.3 The evolution of Higher Education in India:

Indian Higher Education Universities can be traced back to the 'Vedic times' and include the great Universities of Taxila (5th century BC) and Nalanda (6th century AD) (Scharfe, 2002). Along with teaching, research was an essential aspect at these ancient Universities.

From the Vedic times throughout the medieval, Mogul, colonial, post-colonial and now modern times Indian HE has undergone a variety of changes. Even though the HE system has evolved for so long, prominent literature (Duraisamy and Duraisamy, 2016, Kumar, 2014, Sengupta, 2013, UGC-Report, 2010, Agarwal, 2006b, Kapur and Mehta, 2004) show that only recently, i.e. in the last few decades, Indian HE has seen rapid changes. The changes due to the massification of HE, including huge increases in the Gross Enrolment Ratio (GER); the number of institutions, students and staff members along with a change in the philosophy of how HE is viewed and its heavy privatisation (Duraisamy and Duraisamy, 2016, Varghese and Jinsha, 2015, Kumar, 2014, UGC, 2012, Rani, 2010). Such changes are a result of the rapidly evolving socio-economic, cultural, political and professional systems etc. in India and importantly due to the rapid emergence of the 'Middle class' after the economic liberalisation in 1990 (Aprameya and Kishor, 2016, Srinivasa-Raghavan, 2007, Nayyar, 2017, Gupta, 2005, Ganguly-Scrase and Scrase, 2008).

Along with the rapid changes in the society, the role of the HEIs, lecturers and students have also changed. A detailed discussion of the evolution of the educational system post-independence (in 1947) would be lengthy and is beyond the scope of this thesis. However, details on it can be found in Singai and Sridhar (2012) ,Rani (2010) and Deka (2000).

This chapter will focus on the more recent changes (post economic liberalisation) in Indian HE and the issues associated with it. The next section 1.4.1.4 will provide some details on the Indian HE system and its classifications.

1.4.1.4 Classification of the HEIs:

In order to understand the HE system of India in which 35.7 million students were enrolled in 2016-17 (AISHE, 2017a), it is important to look at the types of HEIs and how they operate and are funded.

This section will look at classifying the HEIs according to:

1. Affiliation
2. Discipline
3. Funding and
4. Level of degree the institution can award.

1.4.1.4.1 Classification of HEIs according to affiliation:

The HEIs according to their affiliations: Usually, the colleges are affiliated to a major University, depending on the geographical location and the type of subjects that are taught in the college (Stolarick, 2014, UGC, 2012).

For example, in Coimbatore a city in South India most of the Arts and Science, Commerce and Management colleges are affiliated to Bharathiyar University (BharathiarUniversity, 2018). Most of the Engineering HEIs in Coimbatore are affiliated to Anna University (AnnaUniv, 2017, AnnaUnivCBE, 2017) with a few others also being self-governing or are 'Deemed' Universities, which can award degrees and are not under the Anna University (UGC-Report, 2017, AICTE, 2018).

There are a select few centrally governed Indian Institutes of Technology, Management, Science etc., which are high calibre Universities and are self-governing.

They have their own entrance examinations and mostly recruit the cream of the students. These are the institutions which account for most of the technological innovations in the country (Sengupta, 2013).

The colleges come under a University to which it is affiliated. The University sets the semester question papers, awards the degrees for the Affiliated colleges (University, 2018, BharathiarUniversity, 2018). Deemed Universities are the exceptions as they are allowed to design their own semester question papers, marking and also to award the certificates (UGC-Report, 2017).

Table 3: Classification of HEIs according to the discipline:

S.No.	**Faculty**	**In 2010-11**		**In 2016-17**	
		Total Enrolment	**% to Total**	**Total Enrolment**	**% to Total**
1.	Arts	6,143,959	42.01	10,343,541	40.0
2.	Science	2,822,623	19.30	4,966,190	17.78
3.	Commerce/ Management	2,607,638	17.83	3,893,213	13.5
4.	Education	365,621	2.50	1,187,846	5.39
5.	Engineering / Technology	1,510,762	10.33	4,781,913	9.64
6.	Medicine	508,950	3.48	1,182,971	5.07
7.	Agriculture	80,438	0.55	241,303	0.48
8.	Veterinary Science	20,475	0.14	35,312	0.08
9.	Law	343,688	2.35	475,463	1.16
10.	Others	220,836	1.51	1,321,826	4.33
	Total	**14,624,990**	**100.00**	**29,427,158**	**100.00**

Source: Author, based on UGC-Report (2017),UGC (2017) and UGC-Report (2010).

In total, there are 5.91% of Central Universities, 15.5% of ‘Deemed’ Universities, 32.96% of state Private Universities and 45.3% of State Universities in 2017 (AISHE,

2017a) in India. In terms of State wise Universities, Tamil Nadu ranks 4th with 52 Universities with 935 colleges.

The table 3 provides enrolment data from both the academic years 2010-11 and 2016-17. The total enrolment in 2016-17 is shown to be 29,427,158 (UGC-Report, 2017) which contradicts the approximate 35 million enrolment claim by AISHE (2017a). The researcher supposes that the claim by AISHE also includes the stand alone institutions and diploma courses which are not included by UGC (2017) but is not sure about it.
Table 3 shows a 101.2% increase in the number of students enrolled from 2010-11 and 2016-17. Even though the % of students enrolled in engineering and technology has gone down from 10.33 to 9.64, the total number of students has increased from 1,510,762 to 4,781,913 which is a 216.5% increase. This is a phenomenal increase in such a short span of time.

1.4.1.4.2 Classification of HEIs according to funding:

In terms of funding, the HEIs can be divided into fully sponsored Government HEIs, University managed, Government aided and unaided private HEIs as seen from UGC-Report (2017) and UGC-Report (2010). While the Government HEIs are fully funded by the Government, the private ones rely on tuition fees from the students. Overall, 78% of the HEIs are managed privately, 64% of those are private-unaided and 14% being Private aided. Tamil Nadu has 76% of its colleges as private-unaided, whereas another state Assam has only 10% private-unaided colleges (AISHE, 2016).
Stolarick (2014) classifies the HEIs as: 1. Central, 2. State and 3. Privately funded HEIs.
The UGC which is a part of the Ministry of Human Resource Development (MHRD) and other ministries fund the Central Universities including the Indian Institutes of Technology (IITs) and around a hundred other Universities that come under the state

jurisdiction. The state Governments contribute little funding to these institutions, but do fund partly or fully the 'State funded Institutions'. Few of the private institutions also receive funding from the state or the Central ministries as 'aid'.

The private 'unaided' HEIs are the dominant in numbers compared to the aided ones. With more than 80% of these HEIs relying on non-Governmental funding sources such as tuition fee, donations and capitation fees (capitation fee is an illegal amount collected by any educational institution more than the stipulated amount by the norms of the regulatory bodies) etc. The other 20% are funded by Government. In theory, the private 'unaided' HEIs are 'Not for Profit' institutions, but most do operate on a 'For profit' basis often collecting more fees than stipulated by the Government according to Stolarick (2014) and Rani (2010).

In theory, the state and the Central Government of the country shared the responsibility for funding HE and the students were expected to share some cost (Tilak, 1997, Tilak, 1993). But this balance in funding has altered over time with the students and their families having to bare most of the expenses currently (Stolarick, 2014) in all HEIs, unless they have a scholarship.

1.4.1.4.3 Classification of HEIs according to the level of degree awarded:

According to the qualifications awarded, the institutions can be classified as: Degree or diploma granting. The diploma is equivalent to 'Level 3' or 'A –Levels' in the UK, which the students take after the 10^{th} standard (equivalent To GCSE). The degrees that can be awarded include any Level 4 or higher degree, including under graduate, masters and research degrees

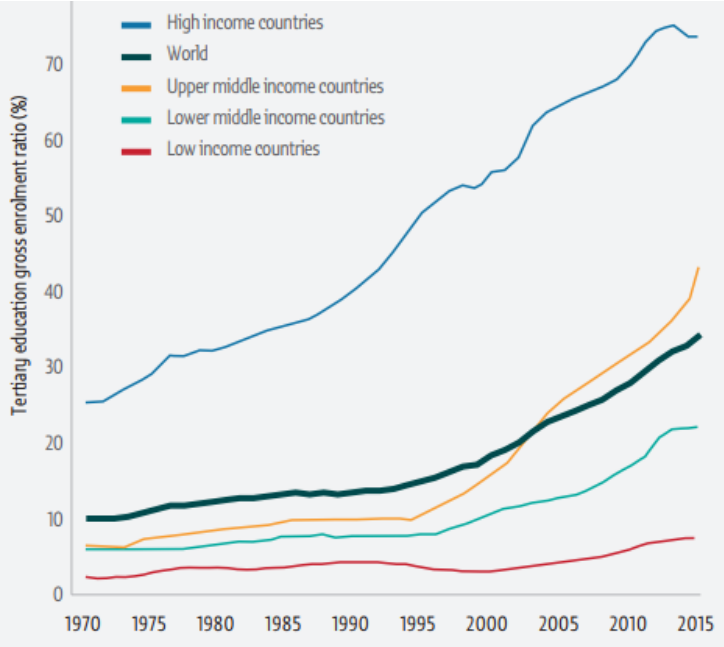
The above classifications of HEIs have provided broad picture of the HE system in India and the rapid increase of HEIs.

1.4.1.5 Increasing HE enrolments: A global perspective:

The growth in the number of students accessing HE is a global phenomenon and not local to India. Governments increasingly see HE as a major contributor to developing the economy. Having a good HE system generates multiple direct and indirect impacts through research, innovation, producing a critical mass of educated people and its associated wider economic benefits (BritishCouncil, 2012). Supporting this is UNESCO-IfS (2014) which comments that University based research does lead to national economic development.

The Global Gross Enrolment was 100 million in 2000 and had increased to 207 million in 2014, effectively doubling in size and growing on an average of 2.5 million students every year (UNESCO, 2017, Varghese and Jinsha, 2015). In the last 20 years, there has been an annual increase of 7% in enrolment in HE from the middle-income countries (India included) and 5% from the lower income countries whereas for the high income countries, enrolment has slowed down to 2% annually (See Fig. 4).

Fig.4: HE GER by country income group (1970-2015):



Source: UNESCO (2017)

Major reasons for the increase in enrolment in middle income countries are the growing middle classes with high aspirations, the increasing pool of eligible students and stable regulatory environments. fig.4 shows the increase in HE enrolment globally. UNESCO estimates that the global enrolment in HE will increase in the near future to more than 250 million (UNESCO, 2017), with India is estimated to contribute a quarter of the global expansion in HE and thus becoming a source of interest for further exploration.

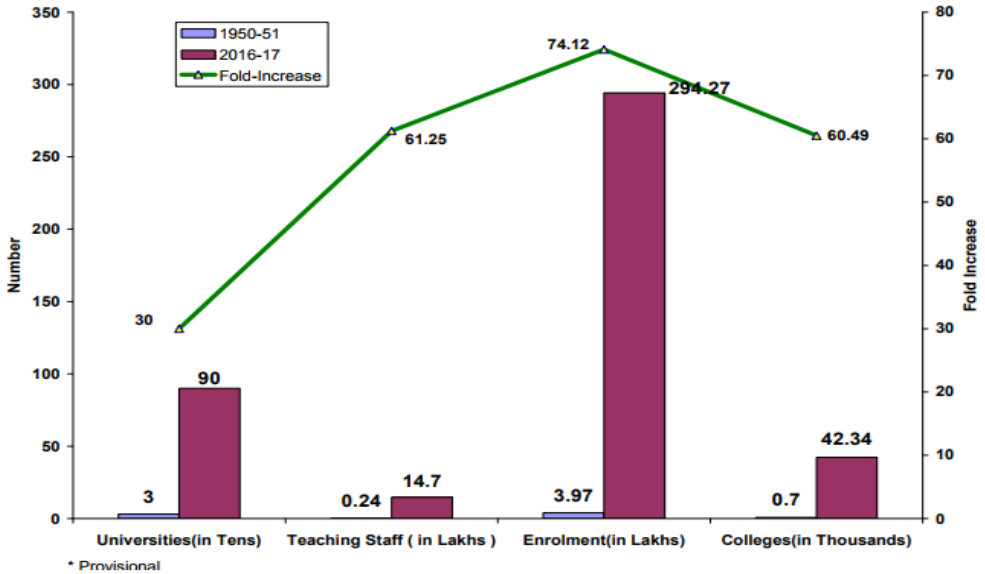
1.4.1.6 Rapidly growing HE system in India:

In the last two and a half decades since economic liberalisation, there has been a tremendous increase in the number of HEIs, staff and students in India. For instance, in the last 17 years alone (from 2000 to 2017) there has been an increase of 205% in the number of HEIs, a 269% of increase in the number of academics and a 311% increase in the number of enrolled students (UGC, 2017, UGC-Report, 2010). This has presented researchers a lot of opportunities to study the characteristics of a rapidly evolving HES: from policy formation to how the HEIs are managed, the academics' research productivity, their stress, student satisfaction, factors of the HES that have influenced and will be influenced by such a rapid change etc.

In 1947, during Indian independence, there were only 520 HEIs with a mere 210,000 students (UGC-Report, 2017, Stolarick, 2014). Currently the Indian higher educational system is the third largest in the world, next only to China and the United States (Stolarick, 2014). By 2020, India will be the second largest overtaking US in terms of students enrolling in HE (BritishCouncil, 2012) and by 2025, India is expected to have

the world's largest student-aged population (Oxford, 2017) thus increasing the need for more HEIs. The rapid growth of the Indian HE system can be seen in fig.5 and 6.

Fig.5: Growth of HE from 1950-51 to 2016-17:



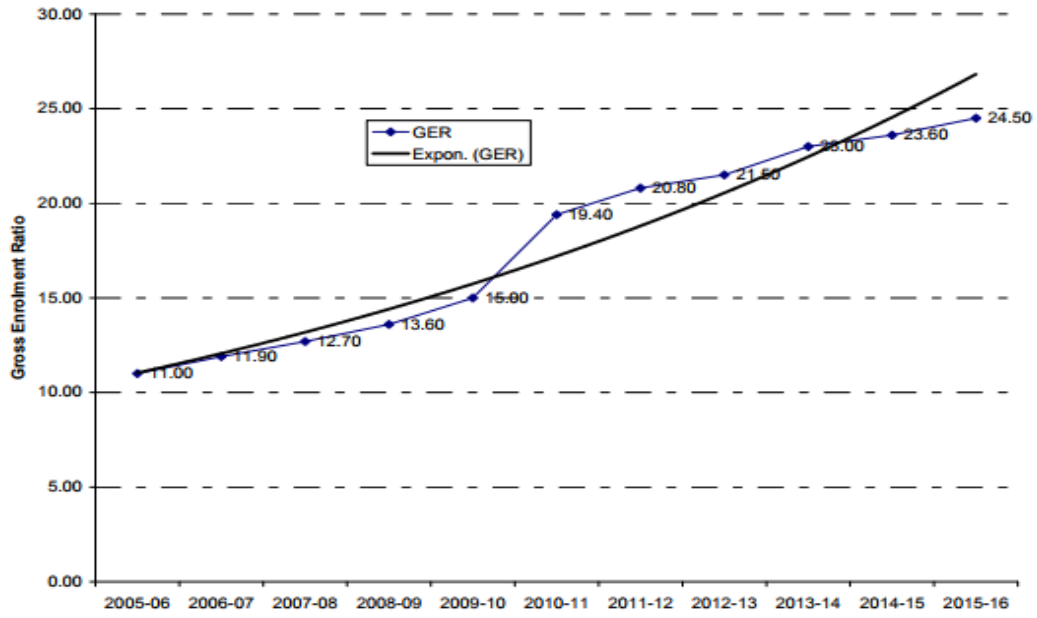
Source: AISHE (2017a)

The total number of students enrolled in Indian HEIs in 2017-18 is roughly half the population of the UK (ONS, 2017), but still only represents a mere 24.5% of Gross Enrolment Ratio (GER) for the 18 to 23 year old Indians (AISHE, 2016). By 2020, the Government aims to increase the GER to 30% (Heslop, 2014). The increase in the GER can be seen from fig.6.

Looking from fig.7, in the last seven years alone from 2010 to 2016-17, the number of Universities has increased from 564 to 864, the number of colleges has increased from 33,023 to 42,338, an increase of 28.21%.

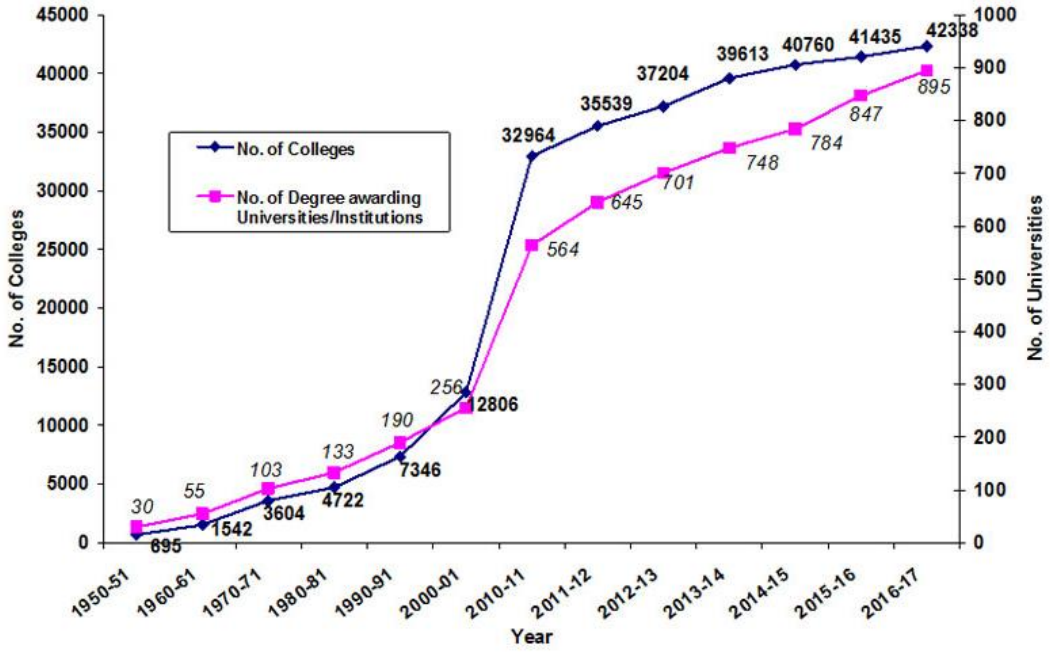
In just the last year alone (From 2015-16 to 2016-17) as many as 903 new colleges were established in various states, thus taking the total number of colleges from 41,435 in 2015-16 to 42,338 in 2016-2017 (AISHE, 2017b).

Fig.6: Growth of Indian Gross Enrolment Ratio:



Source: AISHE (2017a)

Fig.7: Increase in the number of Universities and colleges:



Source: UGC (2017)

It can be seen from table 4 that there is little change in the levels at which the students are enrolled between 2009-10 and 2016-17, where around 86% of the students are

enrolled in UG. PG enrolment has decreased by around 2% and so has the enrolment for research degrees (by 0.1%).

Students enrolling for the diploma programs has increased by 1.45%. There is also a drop in the percentage doing research degrees.

From both Fig. 8 and 9, it is evident that even though the number of students enrolling has increased, the distribution of students enrolling at different levels remains more or less the same.

Table 4: Enrolment statistics by qualification:

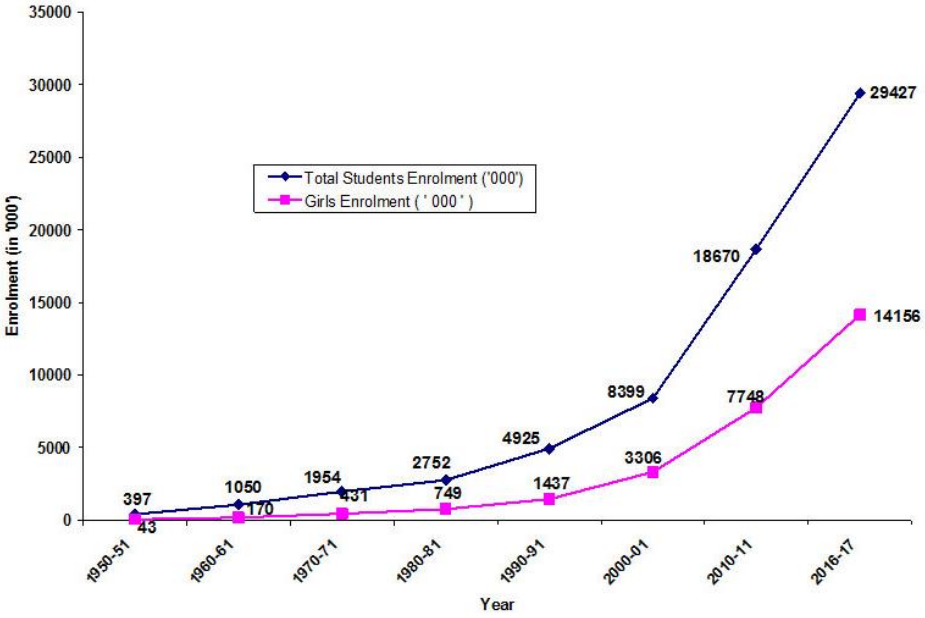
No.	**Level**	**In 2009-10 in %**	**In 2016-17 in %**
1	Graduate	86.55	86.39
2	Post-Graduate	11.49	9.61
3	Research	0.89	0.79
4	Diploma / certificate	1.15	2.60
Total		100	100

Source: Author, based on UGC-Report (2017) and UGC-Report (2010).

With the increase in the number of students and institutions, it is expected that the number of staff members will increase too. Again, from Fig. 9 a similar trend of increase in the number of staff members is seen. From 1990-91 to 2016-17, there has been an increase of 558% in the staff members.

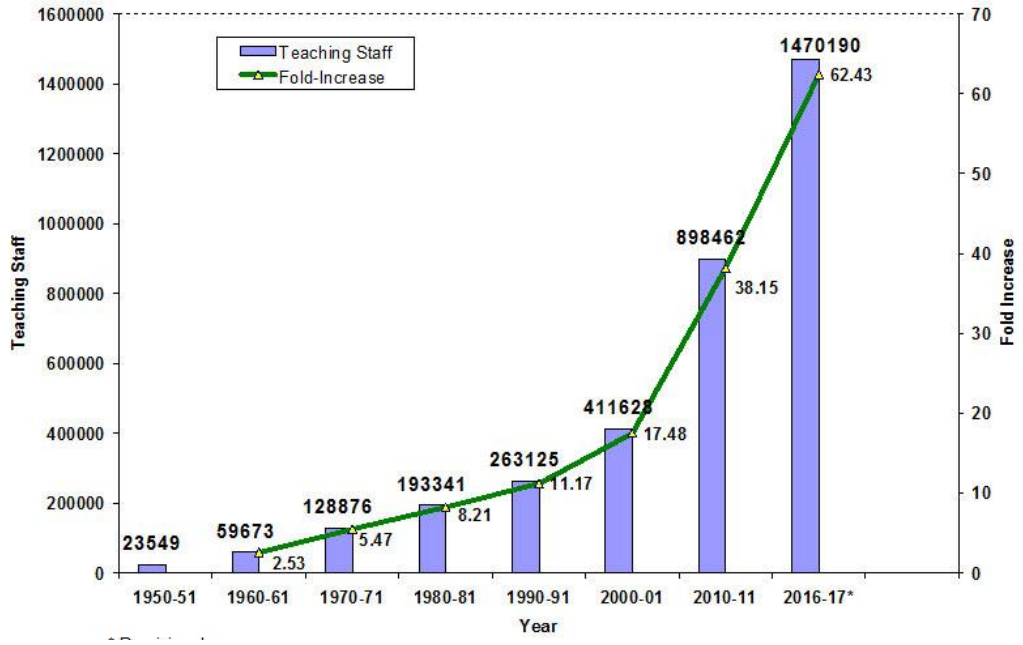
Out of 1.47 million academics, 88.96% were in colleges and the remaining 11.04 % were employed in Universities. There is some discrepancy between AISHE (2017a) which says that there are 1,365,786 and UGC (2017) which says that it is 1.47 million. The researcher is not sure why as they are both reports from Government bodies both under the same ministry.

Fig.8: Rapid increase in the total student enrolment:



Source: UGC (2017)

Fig.9: Increase in the number of HEI faculty members:



Source: UGC (2017)

1.4.1.6.1 Participation of lower caste students in HE influencing the increase in enrolment:

India has one of the oldest and established caste system which had disadvantaged the vast majority of poor people and lower caste people (who form the largest proportion of the population). Until the constitution of India was formed, only the small number of upper caste people were able to get into HE. One of the reasons for the improved enrolment in recent years is the 'Quota system' that is enshrined in the Indian constitution that provides 22.4% of the HE seats available for students from Dalit (The lowest caste) and the other lower castes (CPRHE, 2017). The researcher believes that this system of reservation is one of the major reasons for the increased number of lower caste students to participate in HE. Their participation in HE has not only resulted in their social and economic uplift but also increased HE enrolment.

1.4.1.7 Privatisation of HE and its effects:

During independence, there were only 540 HEIs in the country and most of them were funded by the Government. During the 1980s and 1990s and responding to the World Bank suggestion that developing countries should invest more into primary education rather than secondary and tertiary education (WorldBank, 1994), the government drew back a considerable amount of financial support from HE. The clawing back of the funding and the increasing aspirations of the students towards HE created a huge gap, which was expected to be filled by the private sector (Rani, 2010).

Nayyar (2017), Chandrasekhar et al. (2016), Duraisamy and Duraisamy (2016) and Srinivasa-Raghavan (2007) all suggest that the reason for the privatisation of HE was the result of a combination of things, including: increased demand from the middle class or middle-income families, the inability of the state and Central governments to

increase public spending on HE and the effects of economic liberalisation giving more employment opportunities.

The Government, in order to cater for the demand of higher education, allowed private players to start institutions. The private sector did step up and has now taken over with 78% of the HEIs are being privately owned and managed (Bagri, 2017, AISHE, 2016, Hegde, 2016, Kumar, 2014) with the percentage share projected to increase.

The increase in the % of private HEIs is commendable, but there has been a lot of concerns about the quality of education in the private institutions (Sengupta, 2013, Rani, 2010, Jayaram, 2007) and that they have lost their true purpose of scholarship and have become degree handing shops.

Some of the reasons for questionable quality of HEIs include a serious shortage of quality academics, poor quality teaching, lack of resources, over emphasis on result oriented education and higher education being viewed as a money-making machine (Heslop, 2014, Rani, 2010, Sinha and Sinha, 2008a). Such criticisms may well be justified as despite the steep increase in the quantity of the institutions, no Indian HEIs has yet featured in the world top 100 institutions (Singh, 2017) or even in the top 200 (THE, 2017).

1.4.1.8 Increase of engineering colleges:

The dramatic growth of the HEIs, is reflected in the increase of institutions specialising in professional education. With respect to professional education alone, data from (AICTE, 2013a, Kapur and Mehta, 2004) show that number of seats offered by the private institutions has grown from 15% in the 1960s to 85% in 2013. For medical institutions, private seats have increased from 6.8% in the 1960s to 41% in 2013. In terms of business schools, almost 90% of it is private sector.

In terms of engineering institutions: During the 1990s, there was a huge demand for engineers in the country resulting directly and indirectly from economic liberalisation. The demand for engineers resulted in a gamut of private engineering educational institutions being built.

These private institutions were often owned by industrialists in the local area (Rani, 2010). The number of engineering institutions increased from just 157 in 1980 to 1,522 in 2007 and to around 8,400 in 2016-17 (AISHE, 2017a) on the whole, an increase of 551% in the last 10 years. The intake capacity of engineering HEIs alone grew from 100,000 in 1991 to 582,000 in 2007 (PIB, 2008), to that of 4,781,913 in 2017. Most of this increase has been through private unaided HEIs (AICTE, 2018, AISHE, 2016).

This increase in the number of HEIs and seats available diluted the highly competitive entry to the engineering institutions to such an extent that in recent years, the South Indian HEIs have not been able to manage to fill in their seats (AICTE, 2017b). In the 2016-17 academic year: The available seats for Engineering and Technology HEIs in Tamilnadu was 526,042, but only 271,770 students enrolled in the courses, which means that 51.7% of the seats available are not filled (AICTE, 2017b). The competition would now be for getting admission into a better-quality institution.

Huge growth and privatisation of HEIs, is not a phenomenon unique to India, other Asian countries including China, Vietnam, Cambodia, South Korea etc. have done the same (Altbach, 2015a). Also, Bagri (2017) points out that 30% of global HE enrolment has been in private institutions. But the scale of privatisation, the changes and increase in the number of HEIs etc. in such a short period makes the HE in India an interesting case study.

In addition, the heavy privatisation shows a clear ideological shift for HE, from a more egalitarian to a commercial one. To quote a Supreme Court’s statement of 1992:

"Educational institutions are not business houses; they do not generate wealth. Education has never been commerce in this country. Making it one is opposed to the ethos, tradition and sense of this nation. The argument on the contrary has an unholy ring to it" Kapur and Mehta (2004)

But the heavy privatisation and the various concerns related to how the HEIs operate as will be explored in section 1.4.2 calls to question the egalitarian views expressed by the Supreme Court.

1.4.1.9 Conclusion:

This chapter has provided an overview of the HE system in India, the different types of institutions, the increase of the number of institutions and the heavy privatisation of the institutions. The following chapter 1.4.2 will look at the effects of this and the well documented concerns in the HE system.

1.4.2 Concerns in Indian HES:

The literature showed a range of concerns at various levels in the Indian HEs, which will be explored in chapter 1.4.2.2.2.

1.4.2.1 Introduction:

This chapter will discuss various well documented concerns in the Indian HE system by considering those relating to (i) Governing bodies and national policies on education, (ii) Institutional and management-oriented issues and (iii) The faculty and student related issues. The chapter will also look at issues in HEIs that have recently come to light including corruption, Academic Dishonesty (AD) in research etc. See: TheHindu (2018), NewIndianXpress (2018b), Panchu (2017), Srivastava (2017), (Das, 2017), Mohamedbhai (2016), Sukhtankar and Vaishnav (2015), Mohamedbhai (2015a) and Anandakrishnan (2013) for AD.

There is a general concern with the quality of Indian HEIs based on the world rankings, (Kumar and Dash, 2011) comment on the absence of any Indian HEIs in the top 200 of the world, whereas HEIs from countries such as Singapore and China feature in the list. THE (2017) shows that still there are no Indian HEIs in the world top 200, showing no progress being made in increasing the ranking.

1.4.2.2 Concerns in the Indian HE system:

A range of concerns at different levels in the Indian HES will be discussed in this section.

1.4.2.2.1 Governing bodies and national policies:

To govern HEIs, India has created several regulatory bodies with responsibility for the quality of the system, including the University Grants Commission (UGC), the National Assessment and Accreditation Council (NAAC), National Board of Accreditation (NBA) and the All India Council for Technical Education (AICTE) and the institutions themselves are encouraged by UGC to have their own Internal Quality Assessment cells (IQA). A detailed account of the functions of these bodies can be found in UGC-Report (2017), Varghese and Jinsha (2015) and UGC (2012). However the Centre for Policy Research in Higher Education CPRHE (2017) comments that there is very little empirical evidence showing there has been any change in the quality of the institutions that have been accredited by the NAAC and where IQAs have been in operation and that it has just become a paper work exercise.

The policy of massive privatisation has had a drastic effect on the HE system: in both its ideology and the way it is delivered. As Kapur and Mehta (2004) comment that there has been a shift of the system from a socialist to a more commercialist

perspective. They also comment that the HE system is now being driven by vested interests than by a vision of strong educational reform.

Patil (2015) suggests that there has been a haphazard and unplanned increase in the number of HEIs allowed by the governing bodies, resulting in deteriorating standards and the production of graduates with questionable social values and knowledge. The inappropriate planning and delivery of HE at both the Governmental and organisational levels are also commented by Sengupta (2013). The 'massification' and 'privatisation' of HE even though it has generated opportunities for employment and educational access, has made the HEIs into a 'profit making machine'. Hegde (2016) and Kumar (2014) comment that the governing bodies have failed to regulate the commercialisation of HE resulting in exorbitant fees which the poorer students are unable to pay.

1.4.2.2.2 Concerns at the institutional level:

The poor quality of the HEIs at the institutional level has come under massive criticism, including its effects on students and staff. A large number of the private institutions are even unable to meet the minimum requirements set by UGC (Sheikh, 2017). There are institutions that are registered in hotel rooms or just being run on websites with no physical presence and trace. These institutions have no physical classroom, labs, permanent faculty, library etc. (Tierney and Sabharwal, 2017, Tierney and Sabharwal, 2016). How are they to impart quality education? Let alone research.

The lack of infrastructure; learning facilities for students and facilities for staff to conduct high quality research (Sharma and Sharma, 2015, PIB, 2008, Agarwal, 2006b) has resulted in these academics who are interested in research either going abroad or leaving academia and to go work for NGOs, think tanks etc. (Kumar, 2012).

Thus, the country is losing its critical mass of potential intellectuals, but this loss appears to have put no pressure on the governing bodies to improve quality of the curriculum or in its delivery or the resources they provide.

Another issue impacting the academics' research in HEIs is that most of them are happy with just being a teaching institution and do not employ resources to develop a research focus (Sharma and Sharma, 2015). Sengupta (2013) adds by saying that in fact most of the HEIs just being teaching hubs is a major concern that should be addressed. Similarly, Patil (2015) comments that most of the private HEIs do not care about the quality of education or research and allot very little expenditure towards research activities. Many of the HEIs are more like examination centres and workshops where degrees are bought and handed out and they not being a place for knowledge creation and dissemination (Jahan and Selvarani, 2015). The exam driven practices followed in the schools have now spilled over to the HEIs as well and it stifles the research and creativity of both the staff and students which makes them to focus more on the success rate and the % of marks scored (Sengupta, 2013).

Thanks to the ranking system (NIRF, 2015) of institutions in which research is added as a factor, the HEIs have started to encourage their staff members to conduct PhD research. This is a welcome change in the Institutions, but Kumar and Dash (2011) question if this mass movement towards PhDs will once again be just quantitative or if it would really contribute towards genuine knowledge creation in the country.

1.4.2.2.3 Issues at the staff level:

Academics getting paid less than they should according to the contract is becoming common in the private HEIs (Tierney and Sabharwal, 2017, Kumar, 2014) and thus creating a group of academics who have to work for lower pay and the same workload

as the properly paid academics. Under such circumstances, it would be difficult for them to conduct any meaningful research.

Patil (2015) and Jayaram (2007) comment that in terms of lecturers' qualifications, most of them only hold a Master's Degree. The lecturers are recruited based on 'if they have industry experience' and/or just after graduating their masters. Both these groups are less exposed to research and their lack of interest and experience in research-oriented activities negatively influences both the students and the research productivity of the academics and that of their institutions.

Parashar and Parashar (2012) comment that the lecturers are also lacking a global perspective and that they are happy to remain as a teaching staff and not to actively conduct research.

Also, there is no requirement for staff members to attend any training course to help them to disseminate knowledge to the students. A survey by (Newsweek, 2011) found that only 53% of the University professors held a Masters or a Doctorate degree in India. With Sharma and Sharma (2015)and PIB (2008) reporting a severe shortage of qualified staff.

In terms of the research productivity of the academics, even though the quantity of the papers published in India has risen over the last decade, the citation impact is very low (Gopalakrishnan Saroja et al., 2016, Sharma and Sharma, 2015) questioning the quality of these publications they point out that a lot of the publications are in paid and low quality journals.

1.4.2.2.4 Corruption and Academic Dishonesty at different levels:

In terms of corruption: Parr (2013) reflects on a survey that states that 61% of those who were surveyed perceived that there is corruption in Indian HE.

Various forms of academic dishonesty at the Governing bodies, institution and academics are reported by NewIndianXpress (2018b), Tierney and Sabharwal (2017), Panchu (2017), Tierney and Sabharwal (2016), Aaron (2016), Mohamedbhai (2016), Mohamedbhai (2015a) and Anandakrishnan (2013). These include bribing the inspectors from the Governing bodies, not paying the staff properly, leaking examination papers, impersonation and bribery to get an academic position etc. Such an environment logically would result in students and staff who might become dishonest as well.

1.4.2.2.4.1 Unaccredited HEIs and 'buying' degrees:

The growth of unaccredited HEIs has created a lot of issues. Lakshmi (2012) reports that in 2010, one of the state-run universities 'Rayalaseema University' in South India awarded 2,660 PhDs in just two years that too for subjects that were not even taught there.

Selling of fake academic documents is not new and has been going on at international levels, in many countries and sometimes at a sophisticated and industrial scale, where degrees of major universities are forged or simply duplicated as seen from He-rim (2018), Gulf-News (2017), Farooqui (2017), Das (2017), Weller (2017), Garwe (2015) and Noah and Eckstein (2001). People with such fake degrees are working as CEOs, engineers and in other senior position, which Gulf-News (2017) reports is alarming.

Clifton et al. (2018) report on fake degrees bought by the British from a 'diploma mill' in Pakistan. The people who bought the degrees include nurses, defence contractors, medical consultants. In 2015 alone, that particular agency sold more than 215,000 fake qualifications worldwide. There are similar 'diploma mills' that operate in India (Das, 2017) which sell ranging from school certificates to PhD qualifications. The practice of 'buying' diplomas in India has also over spilled to Nepal, which Poisson (2010) in her UNESCO report state that it is possible that around 140,000 school teachers use degrees and diplomas that were 'purchased' from India.

1.4.2.2.4.2 Example of a high-profile corruption in HE:

2013 saw the 'Vyapam scandal' (CBI, 2017) in India where it was found out that medical entrance examinations were rigged and various malpractices such as this had taken place for more than 10 years. The malpractices include: impersonation of the candidate by some other student, copying, manipulation of answer sheets and records, leaking the key to the question papers to selected students who have paid money and incomplete answer sheets being filled by the teachers involved in the scam (Medicalia, 2015, Das, 2015). The scam involved exam candidates, Government officials, ministers and middlemen (Das, 2015, PTI, 2015). Whistle blowers and investigators were also reportedly threatened and some even killed (Medicalia, 2015, Das, 2015).

1.4.2.2.4.3 Academic Dishonesty and senior management:

In February 2018, the Vice Chancellor (VC) of the Bharathiyar University, Coimbatore was caught red handed accepting a bribe of Rs.30 lakhs (Approx. £ 33,000) relating

to the probation of an assistant professor (NewIndianXpress, 2018a, TheHindu, 2018), thus supporting the suspicion of the wide spread AD within senior management.

NewIndianXpress (2018b) and NewIndianXpress (2018a) in their newspaper articles comment about the AD at the governing body level in which the VCs of Universities bribe the Government officials and ministers to get the position 5 to 50 Crores. (Note that 1 crore is approx. £ 110,000). In Tamil Nadu, NewIndianXpress (2018b) revealed the corruption charges faced by former VC of Anna University Coimbatore and the former VCs of Bharathiyar University in Coimbatore, where this research takes place. Srivastava (2017) reports that the selection of the top management for public Universities are based on political parentage. The above authors call for more transparency in the selection of the VCs and the academics.

The VC bribes the ministers to get the post and in turn recovers the money they paid by getting bribes from various Affiliated institutions under them and the various staff postings under them, from cheating on purchases, office renovations, construction of buildings, producing fake bills, commission from contractors etc. Anandakrishnan (2013) and NewIndianXpress (2018b). They further comment that the education minister delays postings to the aided HEIs until the college management pays them a bribe. The college management gets the money from the academics who are appointed, who in turn indulge in dishonest activities such as extracting a considerable amount of money from their PhD students for supervision, approval of thesis etc. There have also been cases where sexual favours are expected. This creates a spiralling down of the system.

This shows how AD is spread throughout the system and it is surprising that very few Tierney and Sabharwal (2017) have looked at AD in Indian HE based on empirical

data and that no one has looked at the influence of AD on the RP of the academics. This research will address this gap.

The researcher would like to conclude the section on AD with the comments of Tierney and Sabharwal (2016) who comment that the Indian HE has become the 'poster child' for systemic corruption.

1.4.2.2.5 Other issues in HEIs:

Sabharwal and Malish (2017) reports that there are disparities in accessing higher education in India based on: (a) the income levels of the families (Where the children of high earning families accessing H.E. was 7 times higher than those from families on a low income), (b) region wise disparities (in which the southern states have a higher Gross Enrolment Ratio (GRE) when compared to the North Eastern states), (c) rural-urban disparities (urban students having 20% higher GER compared to the rural students), (d) social disparities (socially disadvantaged groups, eg. the Muslim community having a lower GER compared to other groups, especially in STEM subjects), (e) Most of the students stop with bachelors' level creating a disparity of those going for Post-Graduate courses. In terms of the curriculum, Parashar and Parashar (2012) express their concern that the current Indian Engineering curriculum and research has not kept pace with the current global needs and the challenges.

Kumar (2014) comments that the massive increase in private institutions has only helped create a few rich class of college owners and has aggravated inequality of access to HE as the poor cannot pay the money the institutions demand.

Other basic problems facing HE in India include inadequate infrastructure and facilities in the institutions, large vacancies in academic positions, using outdated teaching

methods, classrooms being overcrowded and widespread socio-economic, ethnic and economic imbalances (Jahan and Selvarani, 2015, Sharma and Sharma, 2015). The same authors also point out the declining research standard as one of the major issues plaguing the system. UNESCO-IfS (2014) also points out that a large poorly educated population can help explain the poor innovative performance of the country.

1.4.2.3 Effects of the diminishing quality of HEIs:

India has developed in terms of quantity (number of HEIs and seats) at the expense of quality which is deteriorating (Patil, 2015, Rani, 2010). The poor quality of HE often means that the courses that are offered have little value and a diminished 'Signalling' of the HE system's academic rigour and the graduating students' calibre.

Chakrabarty (2016) reports that only 7% of the graduating engineers are job ready and that they lack critical thinking, the ability to innovate by applying what they learn to real world problems and English skills. When such graduates become academics and start to conduct research, it is a very big step for them. Chakrabarty (2016) and Sharma and Sharma (2015) comment that HE rather to instilling critical thinking and the necessary employment skills, has just become something the students need so that they can get a job.

The Government has started to recognise the low quality of most of the private institutions and the research conducted in them. The University Grants Commission (UGC) the country's apex body for higher education, has introduced in 2015 an initiative called the 'Academic Performance Index' (API) which encourages all staff to score their research work and to quantify their publications which can then be used when seeking promotion, increments etc. (NIRF, 2015). These scores along with other

variables such as the pass percentage of the students will also be used for the ranking of the institutions (API scores are similar to the REF in the UK). The API index shows a move towards increasing the RP of the academics and the institutions. So, it becomes essential to study the various factors influencing the RP of the academics and consequently how it can be improved.

1.4.2.4 Conclusion:

This section of the chapter has looked at the various concerns associated with the HE system such as corruption etc. One of the important questions is if the range of the concerns as discussed in 1.4.2.2 have an influence on the institutions' research policies, and how these concerns and issues have influenced the academics' motivation to conduct research and the resulting productivity.

If these issues do have an influence, then have they been measured and studied? Such a research exploring the influence of these issues on the RP of the academics becomes important, as India's 12th five year plan (Planning-Commission, 2012) emphasises improving the quality of teaching and research thus improving the quality of the graduating students (Oxford, 2017).The literature on the current studies on the RP of the Indian academics will be explored in 2.2.2 and thus assist in identifying any gaps in the literature.

The next section 1.4.3 converges its focus on Coimbatore, the target city for this study. It explores Coimbatore from an economic, demographic and social structural point of view. The chapter then progresses to section 1.4.4 to look at the Engineering institutions in Coimbatore. These institutions form the target population for this research.

1.4.3. Overview of Coimbatore:

This section will introduce the reader to Coimbatore, the target city from an economic and cultural perspective. It will explore the social structure in Coimbatore based on how Coimbatore as a city relates to South India and India as a whole, social structure based on religion and caste.

Geographically, Coimbatore is situated in the South of India, in Tamil Nadu state. The city is at an elevation of 411m from the sea level and is surrounded by the Western Ghats providing a pleasant climate throughout the year. The city is connected to the adjacent state 'Kerala' by the Palghat Mountain pass. Coimbatore is also called as the Peace Park of Tamil Nadu due to its very low crime rates.

The metropolitan area of the city covers 642 km^2, with a population of 2,151,466 (Coimbatore, 2016, Census-of-India, 2001). The literacy rate is 89.23% which is 15% higher than the national average. The male literacy is 93.2% and the female literacy being 85.30% (Census-of-India, 2011b). The population density being 10,052 people per sq. Km (CCMC, 2006).

Coimbatore is famously called the 'Textile Hub' of South India due to the number of textile mills run by the Government and private sector (Coimbatore, 2016). The city is also one of the largest suppliers of motors and pumps in the country. It is developing into a major player in education, manufacturing and commerce (IndianGovernment, 2011). It is the second largest city in Tamil Nadu next to Chennai – the state capital and is the 16th largest Indian 'urban agglomeration'. It is a rapidly developing city and was awarded the best emerging city in 2014 (India Today, 2014). Coimbatore has more than 25,000 Small and Medium-sized Enterprises (SMEs) and is ranked as the 15th most competitive Indian city (EconomicTimes, 2010). The city is second to Chennai in Tamil Nadu in information technology and outsourcing, which is evident

from the Rs.7.1 billion software exports throughout the world (Chandramouli and Allirajani, 2011).

1.4.3.2 Social Structure and culture in Coimbatore:

Social structure refers to the explanations of people's attitudes, behaviour and attributes within a wider social grouping. It refers to the pattern of the more stable relationships among people, institutions and people. It shows where and how different people fit within the society (Crothers, 1996) . Elements of social structure include the economy, education, family, religion, the status of smaller groups within large groups and the expected roles that go with the status (López, 2000).

Looking at the social structure of Coimbatore, in terms of economy, Coimbatore is strong, supported by a range of textile, engineering industries and IT sector. Coimbatore is a major commercial hub in Tamil Nadu and is one of the quickly growing major cities in India. This has provided the people in the city with a lot of employment opportunities. The popular perception is that the extent of poverty in Coimbatore is much less than in cities like Delhi, Chennai or Calcutta.

The economic growth of the city is supported by its strong middle class which form the majority of the population. Coimbatore has been selected to be one of the few cities to become 'Smart Cities' of India (GoI, 2017), this would further enhance its economic prowess. However, similar to the inequity in income in India (MLE, 2018), there is economic inequity in Coimbatore as well. In terms of literacy, Coimbatore was 82.4%, greater than the national average of 73% (Census-of-India, 2001). In terms of the family structure, the differences in gender roles are decreasing in Coimbatore, as both male and female members of the family go to work, earn and share the family chores, but Coimbatore is still a more traditional city compared to cities like Mumbai or Bangalore. For instance, there are no night clubs or discos in Coimbatore and it is very

rare to see in public a female smoking or consuming alcohol. Respecting and taking care of family members (children or elderly members) is taught right from childhood and it remains an integral part of the education the children receive from the family and also in the school.

1.4.3.2.1 Social structure based on religion:

Religious distribution of population in Coimbatore is very similar to that of the whole of India and that of Tamil Nadu, making it a typical South Indian city in terms of religious distribution of population.

Distribution according to religion	Coimbatore (%)	Tamil Nadu (%)
Hindus	83.3	87.58
Muslim	8.6	5.86
Christians	7.5	6.12
Others	0.6	0.45

(Census-of-India, 2011a)

Even though there are a mixture of religion in Coimbatore, it has had little to no religious conflicts in the last two decades and the interaction and socialisation between the various religion has been harmonious to the extent that Coimbatore has been touted as one of the safest places in the country, especially for women Sangeetha (2017). Another popular social structure in Coimbatore, (In the entire country) is the caste system and the duties associate with each of the castes (see Viswanath (2014) more details on this) and the interaction of the society based on the caste system. The following section gives detail on this social structure and its evolution until today.

Social structure based on caste and its evolution today:

1.4.3.2.2 Decline of Social structure based on Caste:

In terms of the caste system, even though it has played a fundamental role in the Indian social structure over the last few thousand years, there have been a range of reforms post-independence in 1947, which has reduced its' influence on peoples' lives. Especially in south India, there have been several reforms which aim to eradicate people performing certain jobs just because of their caste. The pioneering reformers include (not only) Dr. Ambedkar, Mr. Kamaraj, Mr. Yogam and Mr. E.V. Ramasamy (Viswanath, 2014, Jaffrelot, 2006). Despite the reforms, Joshi (2018) argues that the disadvantages of class and caste have not been truly overcome.

Post 1990, after economic liberalisation, there has been a huge social and economic migration of people from the so-called lower castes to that of the middle and high class Osella and Osella (2000). Mostly owing to the opportunities that have been provided by the reforms, urbanisation, decline of closed village community and the investment the parents made in their children' education (Joshi, 2018, Kapur and Mehta, 2004). The researcher has first-hand experience of viewing such a socio-economic migration, for instance, the sons/daughters of coolies, taxi-drivers, security guards, sanitation workers (who usually would be from the so-called very lower castes) become doctors, engineers, work for google, Government, etc., which might have been nearly impossible fifty years ago. The reservation system has resulted in equitable opportunities (as described in sec. 1.4.1.6.1).

Such changes have made the society in south India (with Coimbatore being a typical south Indian city) to evolve from having untouchability as a common phenomenon fifty years ago to now where it is being frowned upon when asked for one's caste. This, along with the researcher being an arch disowner of caste system (and how systematically it has disadvantaged millions of people socially over the years) are the two reasons there has been no mention of caste in this research. Even though it was

mentioned by one of the supervisors to consider including religion and caste in questionnaire whilst designing it, the researcher chose not to include it. This is because questions on religion and caste are taboo subjects and would make the respondents uncomfortable. In addition, within the academic circles, these are little seen as a basis for social structure. Overall, the researcher wishfully anticipates that in the next two decades or even sooner, the residuals of seeing caste as the basis of social structure to have little to no influence. Looking at Coimbatore and its' social structure, it has evolved over the years from being more of a conservative town, to now being much more open.

1.4.3.2.3 Influence of religious values:

This section focuses on Hinduism, its key beliefs, values and practices. The key beliefs (though many) as Vivekanandha comments revolves around the laws of 'Dharma' (one's duties) and 'Karma' (a sum of one's actions in the current and the previous incarnations which influence their experiences in their current or later incarnations) (Chattopadhyaya, 1999). Hinduism does not have one God, but has a pantheon of different Gods, each with their own functions. Hinduism is a composite of several smaller religions and unlike Buddhism, Christianity and Islam, does not have a particular founder. The values and practices in Hinduism are based on 'Vedas', which literally translates as knowledge can be dated as far as 1500 BCE. These are ancient bodies of texts which talks about the ways of living, duties of different caste of people, rituals, punishments for sins, how to purify sins (immersion in the holy Ganges river. Similar to the confessions in Christianity) prayers, mythologies etc. For a detailed treatise on the principles of Hinduism and its associated practices see (Lipner, 2010, Quaglia, 2007, Teece, 2003).

It would be hypothetical to comment on how devout the general population are or the proportion of people who are religious. But in general, most of the people are religious,

visit temples on a regular (depending on the person) basis and celebrate various religious festivals and believe in astrology etc. But it is very questionable how many of the Hindus have read the vedas or the holy books. They might have watched TV series based on them, but the researcher (included) doubts if people read them. It can be said with certain confidence that an average person from India is more devout than an average westerner. But the percentage of people in India following the teachings of the religion is questionable. Similar to every other place and religion, there is always a difference between what the people believe and what they practice in their everyday life, with India and its people not being an exception. India being a community-oriented culture, there is always a 'Us and them' mentality. 'Them' can be people of other religion, other social class, other caste or other state etc. Overall, it can be commented that India and Coimbatore have more religious influences in their values compared to western countries, but it is questionable how many of the people truly follow the doctrines of the religion.

1.4.3.2.4 Religious and shared cultural values:

Similar to most of the countries, the cultural values of India are informed by the dominant religion and its' associated beliefs. In India, cultural identities have been shaped one way or the other through the principles of religion. These include considerations of 'Auspicious time' and/or 'Astrology' for doing specific important things such as a marriage or having a house warming ceremony. 'Vaastu Saastram' (architectural codes), lucky charms etc. are other such practices that have their roots in religion. But elements such as wanting to be 'Role model' to the society, wanting to be of use to the society, delays, externalising the results of their efforts as a gift from God and strict and unquestioned devotion to the teacher/Guru are more of a societal norms and shared cultural values. Even though shared cultural values seem different

to that of the religious values, they have their roots (though largely diminished) based on them.

Philosophies within the same religion, religious philosophies, their influences and interpretations vary widely in India Basu (2002). India being a multi-religious country, it would be complicated and primitive to simplify and point out a few/set of factors as being representative of the religious beliefs and culture. This thesis is not a research in religion and how it influences culture, so has logically limited itself with looking at how culture might influence RP of the academics.

1.4.3.2.5 Clash of the indigenous culture and the changing academic environment:

Even though the country is religious, the changes due to technology, capitalism and the influence of western thoughts and ideas, there are clashes between the indigenous culture and the people's social values. In particular the clashes will be seen from the perspective of the changing academic environment.

The traditional culture does not put any rigid time constraints on the duties to be performed, having the Guru (teacher) in a very high position, considering teaching as a noble profession etc. whereas the CAE (diminishing status of a teacher, HEIs becoming more and more into a money making machine, declining quality of the students, increase in the workload for the academics) and its effects (such as requiring quick publications, efficient work productivity, rigid quantitative assessment of academics' performance) are contrary to each other and there is a clash of values.

Though not a part of this research, from a sociological / psychological point of view, it would be interesting to see if there is a clash between the traditional indigenous culture and the rapidly Changing Academic Environment (CAE) and its demands. It would also be interesting to see if there is a clash between such a relaxed attitude to time

and the time constraints a PhD or research demands of them and that of the institutions pushing the academics to be more research productive.

An easy to understand example of the clash between the shared cultural values and the CAE would be how the concept of 'time' is traditionally viewed and how the recent changes in the HE system clashes with it.

'Time management', 'making use of time' etc. are fairly new concepts that have seeped into Indian culture from the west. In the Indian context, right from antiquity, 'time' is not viewed as a linear, but a cyclic concept. When one creature/person dies, then they reincarnate into a different creature according to their 'Karma' (divine merit). It is common for people to say "At least in my next life, I wish / should have a better job / family, wealth / less complicated life" etc. Even though the concept of 'reincarnation' based on the principles of Hinduism and Buddhism, they have been around for so long that such beliefs have become deeply rooted in people regardless of religion. So, rather than creating such a life now, people wish to / are happy to have them in their next reincarnation. This is one of the reasons that the researcher speculates that people from India are much more relaxed with regards to time management and take their time to conduct research. From the researcher's experience, it is not very uncommon for the academics to stretch their PhD till the deadline and get extensions to be able to finish it. Introspecting on it, the researcher can identify himself with such practices. The researcher supposes that this is not procrastination, but a more relaxed attitude to time and time management. Thus, a shared belief based on religious principle influence the academics' attitude and behaviour, but this contrasts the CAE and its demands.

1.4.3.2.6 The clash of values in academia:

The current CAE demands that the academics produce more papers, are very cautious with their time, give them more teaching and administrative load and

sometimes (increasingly) demanding the academics to work even during the holidays etc. This is different to what traditionally the academics are used to and thus clashing with the traditional values. In addition, the declining status of being a (guru) academic (the researcher was able to observe this first-hand when he was visiting the HEIs for data collection. The researcher finished his UG in 2006 when the academics were viewed with a certain reverence, which had diminished by a huge margin in 2015, within a span of 9 years) is another clash between the CAE and the indigenous culture. This research looks if the CAE influence the RP of the academics, but a future research could delve more into looking qualitatively (which would provide a rich data) if and how the CAE and the traditional culture clash with each other and if such clash influence academics' RP.

1.4.4 Engineering institutions in Coimbatore: An overview

This section provides an overview of the engineering institutions in Coimbatore started after 1990. It will look at the overall demographics of the institutions such as the year of starting, the number of student places available, the number of actual enrolment (Places filled) the number of academics in the institutions and the number of doctorates. This research looks at all the different types of engineering HEIs including 'Universities', 'Deemed Universities' and 'Affiliated institutions'. This research is not concerned about the stand-alone institutions.

This review is done for the following purposes:

1. Introduce the reader to Coimbatore as a city and its demographics,
2. Review the demographics of the engineering institutions in Coimbatore,

3. Most importantly, based on the review, this research selects a representative sample of the target population for data collection, thus avoiding any bias such as selecting / ignoring institutions of a specific demographics.

1.4.4.1 Coimbatore and the HE environment:

This section of 1.4 provides an overview of Coimbatore in its geography, an overview of its HE system, especially focussing on the engineering institutions. It looks at the various demographics of the engineering HEIs in Coimbatore and provides a few observations.

1.4.4.2 Overview of Higher Education Institutions (HEIs) in Coimbatore:

Coimbatore has numerous HEIs the first being the Government Arts College founded in 1875. Currently, Coimbatore district is one of the educational hot spots in South India - encompassing a total of 150 arts and science institutions, 35 polytechnic colleges, 2 dental institution, 3 medical colleges, 78 engineering institutions and 7 universities. Making it one of the educational hotspots in South India (UGC-Report, 2010, Sam, 2011, AnnaUniv, 2017, AnnaUnivCBE, 2017). Along with these there are also HEIs on Ayurveda, Dentistry, Homeopathy, Hotel Management, Management, Nursing, Occupational Therapy, Pharmacy, Physiotherapy, Siddha and Teacher Training Institutes. The complete list can be accessed from Colleges in Tamilnadu (2017) and Colleges in Tamilnadu (2016).

The following section looks at the demographics of the engineering institutions in Coimbatore.

1.4.4.3 Engineering Institutions in Coimbatore:

The first three Engineering Institutions founded in Coimbatore are the Government College of Technology (GCT), PSG College of Technology and the Coimbatore Institute of Technology, started between 1940 to 1960 (DSE, 2011). This section of the research is only concerned with the engineering institutions started after 1990s and not the ones that were operating before then.

As of 2017, there are seventy eight engineering HEIs that produce approximately 50,000 engineering graduates every year in Coimbatore (Sam, 2011, AnnaUniv, 2016). 32 of these institutions were set up between 2007 and 2009, during the set-up of Coimbatore's regional Anna University.

Currently, due to the improperly planned increase in the number of engineering institutions, the institutions are unable to fill the available seats, which is an issue not only in Coimbatore, but also institutions in other districts in Tamil Nadu (Sujatha, 2017) .In the academic year 2017-18 alone, almost 10,000 seats / places were cut from the engineering colleges in Tamil Nadu (TTOI, 2017).

Table 5 (See appendix 5) and figures 10 to 14 etc. will provide an overview of the Engineering Institutions in Coimbatore founded after 1990. The table, and the associated figures should be considered with caution as not all data were available from all the institutions to provide a capable picture. For example, the total number of staff and the number of those with PhDs were available for only 36 (64.3%) of the 56 institutions.

The number of courses and the number of students were available on the Anna University and All India Council for Technical Education (AICTE) webpages such as AICTE (2018), AnnaUnivCBE (2017), AICTE (2017a) and AnnaUniv (2016) and from

the mandatory disclosures (A mandatory disclosure is a document that every institution is expected to have in their website which would have details such as the no. of staff, students courses etc.) of the institutions On their websites. It should be noted that not all the institutions had the disclosure on their website.

Table 5 (See appendix 5) gives detail on the 'Affiliated' institutions, in Coimbatore, the year they were founded, the number of departments they have, and the number of students and staff. This would give an overview of the institutions. Along with these institutions, there are also autonomous institutions and Deemed universities which are not discussed in the table. The reason for not including them in the review is because there is only one 'University' (Anna University Coimbatore) and there are a very few institutions with an 'Autonomous' status or 'Deemed University' status and so are already taken as a part of the target population.

In total, the number of students from the 56 institutions was 34,872. Made up of 29,242 under-graduates, 3,470 post-graduates and 2160 business graduates. It should also be noted that there are institutions for business studies only which have not been included in the statistics as they do not come under the category of engineering institutions.

Note that table 5 (See appendix 5) and the graphs in this chapter are based on the data available on the websites of the various engineering institutions in Coimbatore.

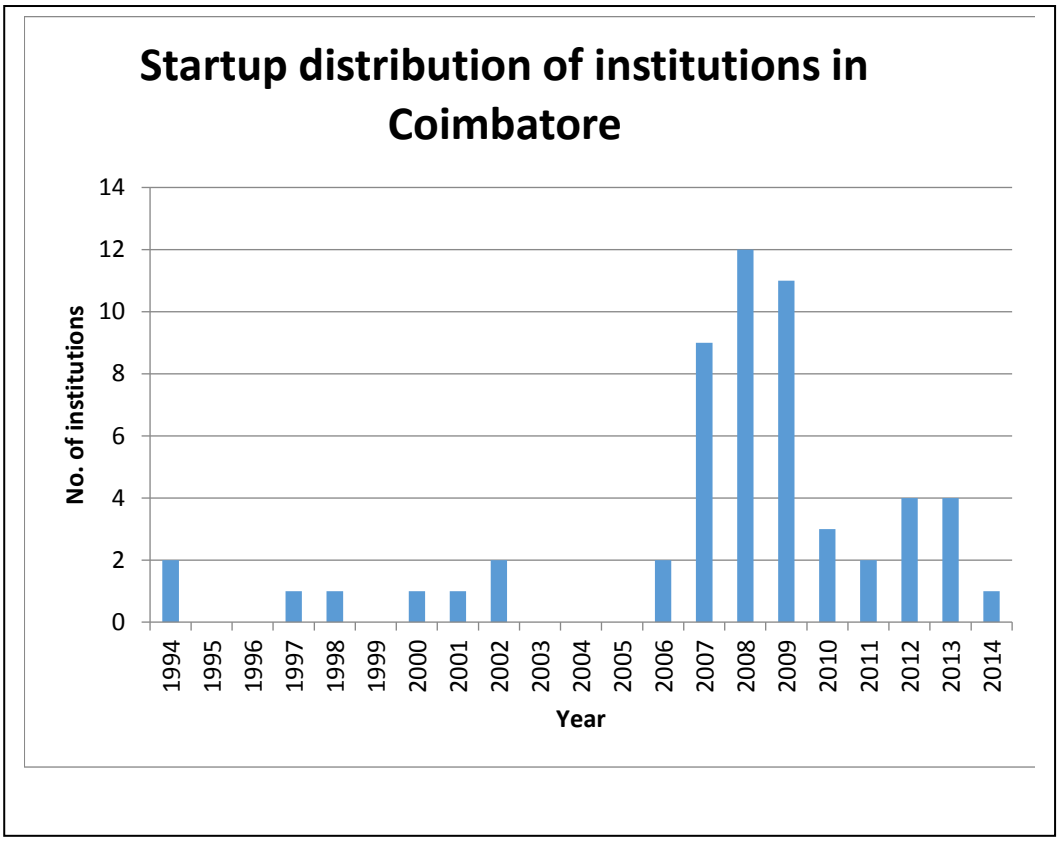
1.4.4.3.1 Demographics of the institutions:

This section gives detail on various aspects of the institutions in Coimbatore, such as the years founded, the age of the institutions compared to the number of students on both UG and PG programmes, the number of staff employed and the number of courses available. This will lead to an understanding of the demographics of the

engineering institutions in Coimbatore. The statistics will also be compared/cross referenced with the pilot exploratory interviews conducted with the academics in 2014/15 when the researcher visited India for exploratory data collection.

Fig.10 shows the distribution of the years in which the affiliate institutions were started. The graph shows that there have been 32 new institutions that started within a span of three years 2007, 08 and 09. This was during the setting up of the Anna University regional office in Coimbatore (AnnaUnivCBE, 2017, AnnaUniv, 2016, AnnaUniv, 2017). Post 2009, the annual start-up of the number of institutions is much lower.

Fig.10: Distribution of institutions according to the year founded (1990-2014):



Source: Author, based on table 5 (See appendix 5)

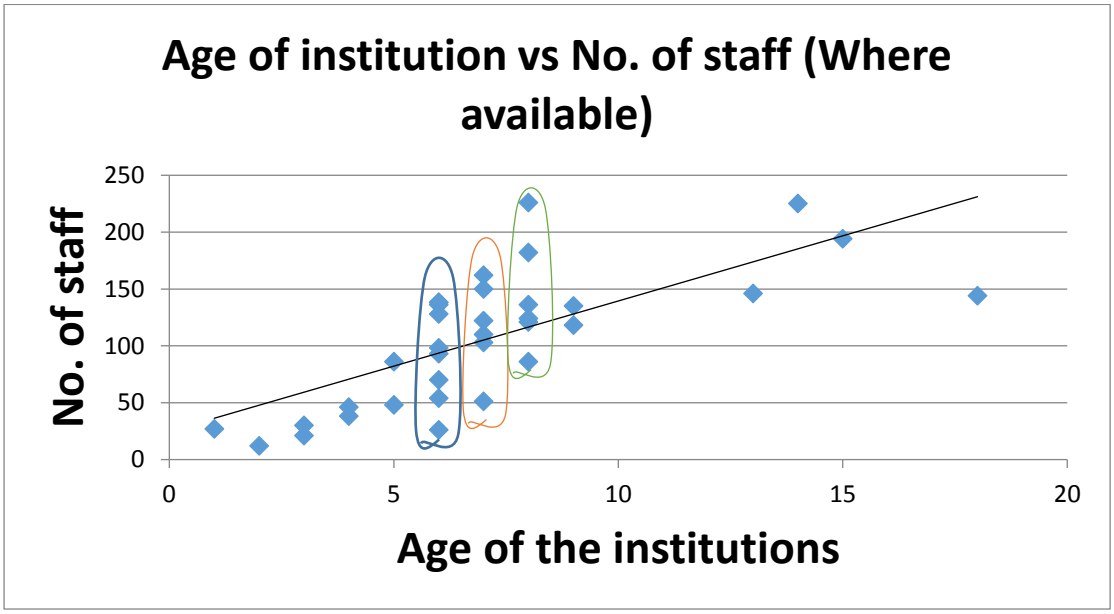
The reason for the rapid increase in the number of institutions was explained by an Interviewee, who stated:

"Without considering if so many institutions are needed, he (AICTE) has given authorisation for many institutions… whoever can apply can start an institution. The requirement is that you have to invest Rs.10 crores (Rs.1 crore = Rs.10,000,000. I GBP = Rs. 85)…so they (The

institutions) apply – so in order to get that 10 crores or 4 crores, he (AICTE) lets them start the institutions."

The trend line in Fig.11 shows that older the institution, the greater number of staff members they employ. The reader should not be distracted by the cluster of data in the middle; it just represents the 32 institutions that were started during the 2007-09 period.

Fig.11: Age of institution and the No. of staff (Those available):



Source: Author, based on table 5 (See appendix 5)

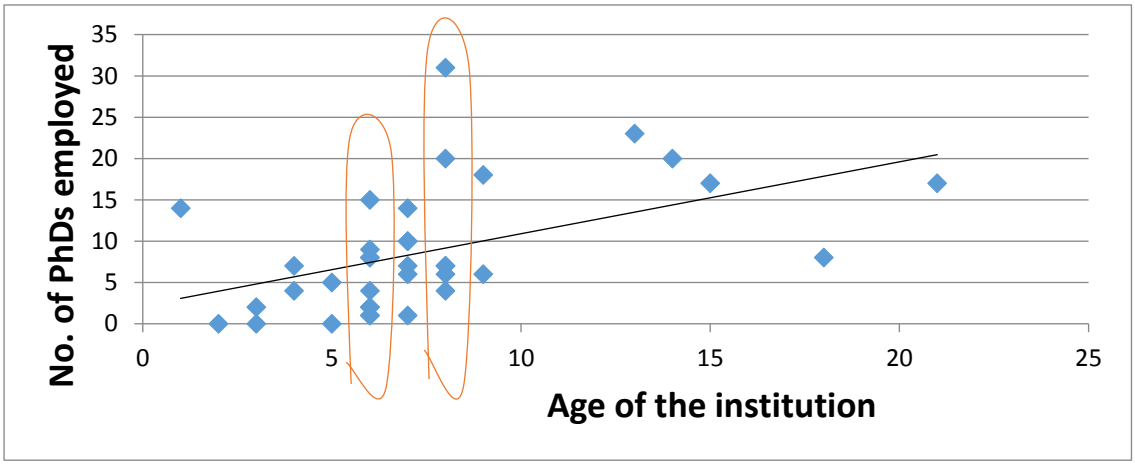
The graph was plotted with those institutions whose data are available either online in their website or from an official reply to the e-mail enquiry.

Noticeable from Fig.11 is the range of the number of staff members employed by the institutions which started during the same year. This can be seen from the circled data. For instance, out of all the institutions started in 2009, institution no. 32 (Table 5 in appendix 5) has 138 staff whereas institution no.38 had only 26 staff members (The researcher thinks that must have been some mistake on the part of the publisher of this data).

One of the important things to notice is that the institutions that have just begun would have only the first batch of students and only a few staff might be required for that year, but more staff would be recruited the next year as there will be a new batch of students and so forth. An example would be institution no.51, which had 21 staff members in 2013-2014 and has more than 85 staff in 2016-2017 (VSBCETC, 2016).

Fig.12 shows that as the age of the institutions increase, they employ more doctorates. Still, similar to fig.4.2, institutions of the same age employ differing numbers of PhD holders, as can be seen from the circled sections. It is interesting to note that a few of the institutions which are less than ten years old are employing similar or greater numbers of doctorates in their institution compared to institutions that are older than 10 years.

Fig.12: Age of the institution and the no. of PhDs employed:



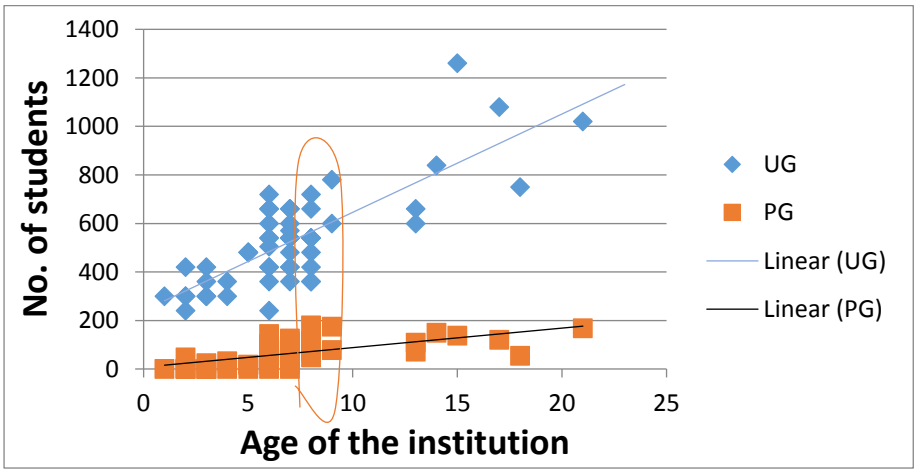
Source: Author, based on table 5 (See appendix 5)

The range of the number of doctorates employed by institutions of the same age is unexpected. For instance, for institutions started in 2007, the available data shows that institution no.12 (Table 5 in appendix 5) employs 31 doctorates whereas institution no.19 (Table 5 in appendix 5) employing only 4, even though they were started in the same year.

Fig.13 shows a similar trend (linear interpolation of the lines) in terms of the number of U.G. students and the age of the institution. As the age of the institution increases so does the number of students in them. It can be seen that there is a rapid increase of the U.G. students compared with that of P.G. students. This is expected as not all graduates wants to do a post-graduate course and that most of them would start working.

Again, as the circled section shows, the range of the no. of students at institutions of same age being large. For instance, for the institutions started in 2008, the highest number of students are from institution no.20 and institution no.29 (n = 660) and the lowest are from institution no.31 for Women (n = 360). Institution no.31 is only for women, so in terms of a co-educational college, institution no.22 and institution no.25 have the lowest number of U.G. students (n=420).

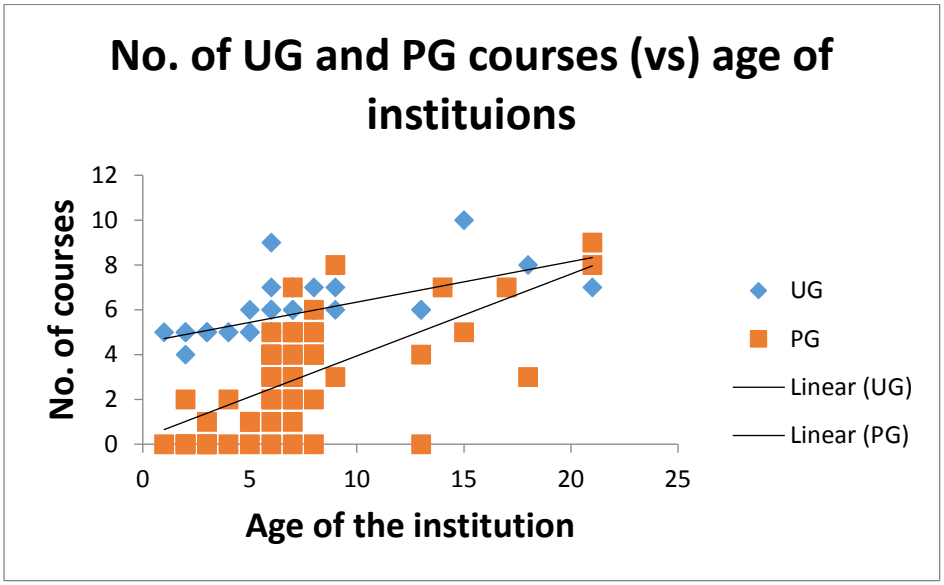
Fig.13: Age of the institution and the number of students:



Source: Author, based on table 5 (See appendix 5)

Fig.14 shows that the number of P.G. courses (A course can be Mechanical, Electrical, Computer engineering, or information technology etc.) increases with the age of the institutions, whereas the number of U.G. courses remains consistent, with most of them offering 5 to 7 courses.

Fig.14: Age of the institution and the no. of U.G. and P.G. courses:



Source: Author, based on table 5

Looking at Fig.13 and 14, it can be seen that while the no. of U.G. students shows a rapid increase, but the number of different courses from fig.4.5 is relatively stable. So, it just shows that it is actually the number of student places/seats available in each of those courses has increased many folds. This ties in well with the views of interviewee no. 3 who stated:

"For example, if you consider 'ZZZ University' there are 18 sections in just Mechanical engineering, for just one year. (By sections the expert means groups or class. So, there can be 18 groups of first year students studying first year mechanical engineering in the same academic yr. One group usually has around 60 students. So, totally 1,200 students studying 1st year Mechanical engineering) *In 'ZXZ' University, there are 20 sections for just one batch (A batch is one year of students). ….. Well, because of this, AICTE along with giving permission to start such a huge number of Affiliated and autonomous institutions, they also said that these (Affiliated and autonomous) institutions can also have 2 to 3 sections right from the first year. So, if just mechanical alone is 3 section in each institution, where are the students for this?"*

Since the comment from the expert can be confusing, a description is provided.

Courses: Mechanical, Electrical civil engineering etc.

Batches/Groups: 60 – 70 first year students studying for ex. Civil Engineering at an institution in the academic year 2015/16. Another batch would be a group of 60-70

students studying for example, third year Mechanical Engineering in the same academic year.

The expert states that AICTE authorised the ‘Deemed Universities’ and the ‘Autonomous institutions’ to have 18 batches of first year students just for mechanical Engineering, similarly 18 batches for electrical, computer and civil engineering courses. Usually, the ‘Deemed Universities’ will have only 1 batch of 60 - 70 students, now having 18 batches takes away the population of students who might have otherwise joined other institutions in the lower spectrum. Seeing the ‘Deemed Universities’ having authorisation to take in so many students, the ‘Affiliated institutions’ demanded a similar treatment. So, AICTE had authorised that any institution even if it is their first year can have an intake of 3 batches of students for each of the courses.

1.4.4.4 Observations:

The tables and the figures in this section gives an overview of the various affiliated engineering institutions in Coimbatore founded between 1990 and 2014. The data shows a large increase in the number of seats available in recent years and it fits with the interview data and the data from various authors, including AISHE (2016), Rani (2010), UGC-Report (2010) and Cheney et al. (2005)

From the mandatory disclosure documents of the various institutions (Can be found in each of the institution’s websites), it is seen that the new institutions are struggling to fill in the seats that are available, meaning that only half or even fewer students actually enrol compared to the seats available. For example, Institution ‘QWE’ have a year wise sanctioned intake of 120 students for their Mechanical Engineering course, but only 24 students actually joined the course and all the remaining seats were vacant.

In another institution ‘EWQ’, out of the 60 sanctioned seats for the Electronics and Communications engineering course, only 23 were taken. This can be a result of the autonomous institutions and Deemed universities having more than three or four batches in each of the department (Mech. Eng., Civil Eng. Etc.). This means that one such institution may now have an intake equivalent of 3 affiliated institutions. So effectively taking students who might otherwise have chosen the lower strata or the newly formed institutions. Since the well-established institutions take in more students, this leaves the new institutions to fight for the left-over students.

1.4.4.5 Conclusion:

This section gives a good picture of the various engineering institutions in Coimbatore, their demographics in terms of the number of staff, students and the doctorates they employ. The chapter has also looked at the relation between the age of the institutions and other demographics. The general picture is that as the age of the institutions increase, so does the number of students, staff and the number of PhDs they employ. There is also a wide range in the number of students, staff and the number of PhDs employed by the institutions of the same age as well.

This has given a good overview from which the researcher can select the sample for the research (Described in detail in the methodology chapter, sec.3.10). The next section of the chapter will explore the literature on the various factors that influence the RP of the academics.

Chapter 2: Literature Review

The literature review chapter is divided into two sections, each exploring the literature related to a range of elements relating to the research. Initially, the predominant theories of motivation will be seen. This is followed by a section on the various factors affecting the RP of the academics.

2.1 An overview of the theories of motivation:

Chapter 2.1 will give an overview of the various theories of motivation, including the classical theories such as the needs theory, cognitive, goal-setting theories etc. It will also explore the modern theories such as culture, creativity and group.

2.1.1 Introduction:

A comprehensive understanding of the way in which an organisation functions requires a thorough understanding of the why people behave the way they do on job (Taylor, 2004, Herzberg, 1959, Maslow, 1954).

A particular behaviour is seen in a person because of their internal/external motivation and the circumstances that influence them to act in that way. The internal/external motivation is a result of complex interactions of various factors (Herzberg, 1959). In order to comprehend or to create a desired behaviour it is important to identify, understand and theorise the factors that result in motivation. Not only that, they also have to be tested rigorously with respect to differences in gender, culture, geographical locations, economic differences and type of work area (Di Cesare and Sadri, 2003, Søndergaard and Hofstede, 2001).

2.1.2 Motivation to work – an overview:

Motivation as a concept can be looked at from various perspectives such as psychology, economics, organisational behaviour, cognition, learning and education in general. In this research, motivation will be looked from the point of view of work motivation. Since this is an overview of the different theories of motivation, a particular focus on academics' research motivation is not made in this section. Academic motivation to conduct research will be seen in section 2.3.

2.1.3 Defining motivation:

Herzberg (1959) in his critically acclaimed papers, defines motivation as a function of both ability and opportunity, commenting that a person feels motivated when provided with an opportunity to express his ability. Pinder (2014) views work motivation as an invisible force that is internal and of hypothetical construct, which cannot be directly measured. He also views motivation as a combination of external and internal forces that initiate a behaviour and that determine characteristics such as the behaviour's form, direction, intensity and duration. Motivation according to Bartol and Martin (1998) and Mitchell (1982) is the psychological process that causes the stimulation of, persistence and that gives direction to any of the voluntary goal-oriented activities.

Works of McClelland et al. (1976b) state that motive of an individual is a learnt construct and as

"A strong affective association characterised by anticipatory goal reactions and based on past associations of certain cues with pleasure or pain."

Ryan and Deci (2000) state that motivation is based on a gamut of internal/external elements that determine its characteristics such as intensity and longevity.

The elements that constitute intrinsic motivation include trying to understand and accomplish a goal, enthusiastic task involvement, competence, autonomy, a desire to experience novelty and goal orientation (Fredricks et al., 2004). Extrinsic motivations are those motives that orient a person towards a task by virtue of external rewards. These include appreciation, feedback, praise, monetary increments, grades etc. (Vansteenkiste et al., 2006).

Essentially motivation could be defined as an internal psychological state of a being that arises out of certain needs, that arouses the being to persist in a particular way to achieve certain desired outcomes.

2.1.4 Goal of the theories of motivation:

A thorough philosophical and empirical understanding of the previously mentioned factors and their complex relationships with the behaviour of an individual has been the goal of the theorists of motivation. The modification and manipulation of those factors is used in psychology for the betterment of an individual, in an industrial setting for creating a motivated and productive work force, and in educational sector for creating more motivated students and staff who are productive in research and teaching.

Therefore, the primary concerns of most of the theorists are to comprehend,

1) What energises human behaviour?
2) What gives direction to such behaviour and
3) How this behaviour is maintained or sustained, as it forms the driving force for humans to behave in certain ways.

2.1.5 Theories of Motivation:

In order to understand human behaviour, various theories have been proposed from the earliest days. Early thoughts and reflections on motivation can be found in the works of ancient Tamil poetess Avvayaar of South India and also in that of Plato. Even now after many millennia, research such as this that the author is engaged with, still is being conducted on motivation. The major reason being that motivational practices and the motivation of an individual is a dynamic aspect which changes based on a gamut of factors such as personal, professional, organisational, cultural factors etc. which themselves are subjected to rapid changes.

2.1.5.1 Evolution of the theories of motivation:

The following section briefly describes the evolution of the motivational theories to date. During the early part of the twentieth century, research on motivational practices were not theoretical (Latham and Ernst, 2006) and understanding employee motivation was left to engineers who focused on ‘monetary benefits’ and ‘wanting to earn more money’ being the primary motivational factor. Scientific Management Theory (SMT), by Taylor (1911) is one of the early empirical theories that advocated scientific principles and ergonomics for improved industrial productivity. The theory split the complex work process into simple tasks and considering the employee part of a big machine. This was met with wide criticism, as it detrimentally reduced the human worker from being a thinking and complex organism to being just a part of a giant machinery, where they were just required to follow the instructions set by the senior managers. The work was also highly criticised for its repetitive nature and the high burnout the employees faced (Ambrose and Kulik, 1999).

As an alternative to SMT, human centred theories became popular with industrial/organisational psychologists looking at the issues of employee motivation. From then onwards research on motivation by Alderfer (1969), McGregor (1960), Herzberg (1959) and Maslow (1954) have concentrated on identifying, classifying, structuring and testing the various factors that contributed to work motivation. Later on, theories evolved to explain how external factors influence a person's motivation and the complex interaction between them.

After this, the cognitive learning theories explained how one's motivation is affected by experiences and how one's environment affects an individual and how the individual affects the environment. Other theories looked at motivation from the point of equity between one self and that of a comparable other (Greenberg, 1987) and (Adams, 1963). Later on theories on cross cultural management by Hofstede (1980), goal setting (Latham and Ernst, 2006), justice (Greenberg, 1987) and groups (Janz et al., 1997, Pearson, 1992, Cordery et al., 1991) were formed.

The research into the understanding of employee needs and motives peaked during 1970s and 80s (Iqbal et al., 2012, Devadass, 2011, Ambrose and Kulik, 1999). Research on motivation during the 1990s mostly focussed on areas such as examining and understanding the job attributes that motivate individuals, research that looks at the need for achievement and the impact of the 'protestant work ethic' (Ambrose and Kulik, 1999).

Theories of motivation according to Ambrose and Kulik (1999) can be classified into two types, the classical theories and the modern ones and this thesis shall explore the literature on motivational theories based on this classification.

2.1.6 Classical theories:

2.1.6.1 Hedonistic Theory:

This is the oldest theory that is used to describe what motivates the human behaviour. It is based on the principle that an individual pursues things that brings forth pleasure and avoids things that brings pain and discomfort. The theory suggests that in cases where even if an individual is to encounter discomfort in order to attain pleasure, the resulting pleasure would be higher to that individual than the discomfort endured (Bentham, 1789).

Even few of the theories that were developed during the 1930s were hedonistic in nature. With Graham and Weiner (1996) commenting that many experimental analysis were set up primarily with non-human subjects to identify the various motors of behaviour such as arousal, drive, need and energisation which were considered to be the prime factors that enabled a static organism to a state of activity.

2.1.6.2 Motives and Needs Theory:

The basic concept of the needs theories is that whenever there is a need that arises in an individual due to a deficiency, then the individual is motivated to act to satisfy that need and to fulfil that deficiency. It is this internal state of disequilibrium between what he has, has not and wants - that energises the individual to trigger an internal response. A need can be either physiological or psychological.

2.1.6.2.1 Maslow's Need Hierarchy:

Maslow's theory (Maslow, 1954) is one of the most famous theories of motivation that attempts to explain the behaviour of an individual. Maslow identified a hierarchical

pattern in the need levels that tend to motivate an individual. Maslow classified 'needs' into lower level or deficiency needs and the upper level or growth needs. The five essential needs identified by Maslow are, physiological, safety, social, esteem, and self-actualisation needs (See Table 1). If one level is satisfied, then the individual is no longer motivated by that particular level and the person progresses to the next level of needs (Hamel et al., 2003).

Three of the important concepts of Maslow's theories are,

1. Only when a person's lower level need is satisfied does he come to full awareness of the higher-level need.
2. An individual may be motivated by more than one level of need at a particular time, but when a lower level need is threatened, it dominates the individual's behaviour (Betz, 1984, Maslow, 1954).
3. Only when the higher levels of needs are satisfied in a person, people would be able to realise their full potential, if they are not, they might experience alienation, cynicism or apathy.

Table 1: Maslow's hierarchy of needs:

Levels	**Elements of the needs**	**In an organisation**
The physiological needs	Food, water, sleep, oxygen and sensory satisfaction.	NA
Safety and security needs	Desire for security, stability, dependency, protection, freedom from fear, anxiety, need for structure, law and order etc.	Company benefits, safe working conditions and job security
Social needs	Belongingness and love, emotional friendship, affectionate relationship, with people in general but especially a spouse, children and friends	Cohesive work group, friendly supervision and professional associations

Esteem needs	Desire for respect, esteem for the self and others, a desire for strength, achievement, adequacy, mastery, confidence, independence and freedom	Social recognition, job title, high status job and feedback from the job itself
Self-actualisation	self-realisation, continuous self-actualisation, continuous development and the process of becoming all that an individual is capable of becoming	Opportunities for creativity, achievement and advancement in work

Source: Author based on (Wahba and Bridwell, 1976, Maslow, 1954).

2.1.6.2.1.1 Applications and criticisms of Maslow's work:

Maslow's work has been criticised for its 'Uncritical acceptance' by Daniels (1988), Wahba and Bridwell (1976) and Hall and Nougaim (1968). In addition, Neher (1991), Betz (1984) and Lawler and Suttle (1972) report limited or partial empirical evidence for the validity of the model. Even Maslow himself commented that the model is not universal and should not be over generalised. Noltemeyer et al. (2012) used Maslow's framework to study the academic achievement of school children and was able to find considerable evidence that even more than 50 years since the theory being proposed, it still holds true. The studies on job satisfaction and motivation of academics in India reported in the literature have extensively used Maslow's theory. For more detail, see chapter 2.3.2.

2.1.6.2.2 Herzberg's Two Factor Theory:

Herzberg's 'Motivation-Hygiene theory' or simply the 'Two factor' theory (Herzberg, 1959) in contrast to the previous models, sought to understand how work activities and the nature of one's job influences motivation and performance. The theory also comments that the factors that cause job satisfaction and job dissatisfaction differ from each other. Herzberg called the set of factors that motivate as 'Satisfiers' or 'Motivators' and the factors that do not contribute to motivation as the 'Hygiene factors'. Hygiene factors are those which do not motivate an employee when present,

but when they are absent will lead to demotivation of the employees. The emphasis of Herzberg's theory is that the absence of hygiene factors does not ensure job satisfaction, but their removal will be a de-motivator. The continuum of hygiene factors is from de-motivation to no-demotivation/ no-motivation, whereas the continuum of the motivation factors is from no-demotivation / no-motivation to motivation.

The job enrichment movement was initiated by the two factor theory which comments that an employee feels motivated where there is opportunity to express his ability (Herzberg, 1970). He further argues that if the talents of an employee are not completely utilised, it can lead to motivational problems. Vroom (1979) and Locke (1975) criticised the two factor theory as being methodologically incorrect pertaining to the 'critical incident technique' used by Herzberg. For a detailed review on the criticism on critical incident technique see Locke (1975).

2.1.6.2.3 Reinforcement Theory:

The reinforcement theories by Skinner (1953), Hull (1943) and Thorndike (1911) comment that 'consequences influence behaviour', which means that people do things because they are aware of the consequences that will follow and depending upon the types of consequence an individual will continue or avoid a certain behaviour (Bolles, 1975). These theories introduced motivation as a learned behaviour. (i.e.) Current or future behaviour is largely influenced by the rewards/punishments associated with the previous efforts.

The three "golden rules" as stated by the theory are,

1. Rewarding consequences increases a particular behaviour,
2. Punishing consequences decreases that behaviour and

3. When a consequence is not punished or rewarded, it extinguishes that particular behaviour.

Some of the limitations of the theory are that it is difficult to identify rewards and punishments as reinforcements, as rewards and punishments vary from individual to individual. Even if those functions are identified effectively, they lose their value over time as a worker, when he/she gets rewarded for a particular thing continuously; he gets bored and loses his interest/motivation. Workers may even start to hate the managers who tend to punish them either verbally or financially, also it becomes difficult for a manager to design a particular practice that suits all the workers and a strong performance reward relationship is hard to create.

2.1.6.2.4 ERG Theory:

Alderfer (1969) in his 'Existence, Relatedness and Growth' (ERG) theory, combined Maslow's lower level needs as being 'Existence' needs. Factors included in this level are fringe benefits, salary, safe working conditions etc. The 'Relatedness' level combines Maslow's love and esteem needs. The 'Growth' needs refer to the need in terms of career development, success by learning overcoming challenges etc. The theory further comments that a person at a particular time may be motivated by more than one level of needs. For example, a need for promotion may arise out of the need for higher salary, or to belong to a particular set of people or for self-esteem, is not clearly explained by the hierarchical theory.

The questionnaire links Maslow's theory (Maslow, 1954), ERG and the two-factor theory (Herzberg, 1959) with the research. In section 2 of the questionnaire, by asking Likert scale questions on the different needs level such as safety and security needs (job security, working conditions), social (colleague environment), esteem needs (Social recognition, job title etc.). The questionnaire also implicitly looks at both

hygiene needs and internal motivators. Questions on hygiene needs include questions on their work environment, facilities available, salary and colleague environment. Similarly, internal motivator questions include growth and advancement questions, recognition and work itself. Reinforcement theory was linked more with qualitative data collection, where the reinforcement behaviour of participating in AD, conducting proper research were explored.

2.1.6.3 Theories on cognition:

In the 1960s, motivational theories saw a shift in its paradigm from mechanisms and needs to that of cognition. A brief description of some of the prominent theories in cognition are discussed in this section.

2.1.6.3.1 McClelland's 'Learned Needs Theory':

The learned needs theory (McClelland et al., 1976a) comments that the 'motivators' are learnt from previous experiences and events acquired from the environment and culture. The theory comments that there are primarily three needs that dominate the behaviour of a person. They are the need for affiliation (n-affil), need for power (n-pow) and need for achievement (n-ach). The behaviour of a person is a combination of these three needs. The bias and the extent to which each of these needs dominate a person's motives can be used to explain why an individual with a particular need behave differently from those who do not seek it (Cherrington, 1991, Littunen, 2000).

2.1.6.3.2 Drive theory:

Hull (1943) was an early proponent linking theories of motivation with experimental psychology. Contrary to earlier theories, Hull proposed that a physiological deficit is what instigates an organism to act in a certain way.

Hull proposed the equation

Behaviour = Drive x Habit

Where drive is a result of the disequilibrium between need and the current self and habit gives direction to the drive. This multiplicative model meant that if there were no deprivation at all (i.e. Drive = 0) there would be no behaviour even though the habit is very strong. The major contributions of drive theory is that it studied motivation through experimental and scientific methods (Graham and Weiner, 1996).

2.1.6.3.3 Lewin's 'Field Theory':

Lewin (1951) suggests that both the person and the environment influence an individual's behaviour.

Behaviour f (P,E)

According to field theory, the motivation of a person to attain a certain goal is determined by three factors: Tension or the magnitude of the need (t), the properties of the goal or the valence (G) and the psychological distance between the person and the goal (e)

Motivational force = *f* (t,G)/e

When an organism experiences a need, then it is in a state of tension, which motivates the organism to attain the goal. When the goal is attained, the state of tension is released. In addition, since the psychological distance of the goal and the individual are inversely proportional, when the goal is in sight, there is much more motivation

whereas if the psychological distance of the goal is large, then there is less motivation and vice-versa.

2.1.6.3.4 Expectancy Theory:

This is one of the early cognitive theories developed from the works of Lewin. It comments that an individual acts more by conscious decisions rather than instincts. Expectancy theory by Vroom (1964) postulates that motivation of a person is goal directed and purposeful to the individual. The theory comments that an employee tends to evaluate rationally various job behaviours such as working harder, longer hours, lowering the input, contributions of ideas etc. and tends to choose the behaviour that he believes shall lead to their most valued outcomes such as higher salary, fringe benefits, promotion etc.

Lawler and Suttle (1973) and Hackman and Porter (1968) expanded the expectancy theory by linking the role of individual differences and role clarity to that of the job effort and performance and how they are related to intrinsic and extrinsic motivation (Gagné and Deci, 2005). Based on Vroom's theory, two distinct lines of theories evolved, first is Atkinson's achievement-motive theory (Atkinson, 1957) and the other being the Self Determination Theory (SDT).

2.1.6.3.5 Atkinson's achievement-motive theory:

Atkinson (1957) was interested to understand factors influencing an individuals' motivation to achieve. Along with Mc Clelland, he developed the theory of achievement motivation also called n(eed) achievement – which sought to explain how the motive/tendency to succeed (T_s) and motive/tendency to avoid failure (T_{-f}) influenced behaviour. The theory comments that achievement-oriented activities are always

associated with a tendency to avoid failure. The theory focuses on the resolution of conflict of these two motives (Weibell, 2011).

Feather (1966) comments that the tendency to succeed (T_s) is a product of the motive to achieve success (M_s), the subjective probability of success of the activity (P_s) and the incentive value placed on success by the individual (I_s)

$$T_s = M_s \; x \; P_s \; x \; I_s$$

Similarly, the tendency to avoid failure (T_{-f}) is a product of the motive to avoid failure (M_{AF}), the probability/expectancy of failure (P_f) and the incentive value of the failure (I_f)

$$T_{-f} = M_{AF} \; x \; P_f \; x \; I_f$$

2.1.6.4 Self Determination Theories (SDT):

SDT, are a set of humanistic theories that tries to explain the internal locus of motivation that an individual possesses. The basic assumption is that all people exhibit persistent positive features or 'Inherent Growth Tendencies' and that

people are active beings with inherent and deeply evolved tendencies towards psychological growth (Ryan, 2009) to achieve their inherent needs. If the surroundings/environment is conductive to these inherent tendencies, then the person feels motivated and vitalised. If these needs are prevented, then the person experiences diminished motivation.

The theory strongly supports employee empowerment and emphasises strong culture of intrinsic motivation. SDT is formed from five branches of theories explaining intrinsic/extrinsic motivation and its' interaction with surroundings. They are:

1. Cognitive Evaluation theory (CET)
2. Organismic Integration Theory (OIT)
3. Causality Orientations Theory (COT)
4. Basic Psychological Needs Theory (BPNT) and
5. Goal Contents Theory (GCT).

For a detailed review and literature, applications and criticisms of the above five theories see Ryan and Patrick (2009), Vansteenkiste et al. (2006), Enzle and Anderson (1993), Rummel and Feinberg (1990), Erez et al. (1990), Deci and Ryan (1985), Vallerand and Reid (1984), Ryan (1982), Deci and Ryan (1975), Deci (1971) and Ryan (1970).

The questionnaire uses Self-Determination Theory (SDT) to create questions that focus on the research competence of the academics and their perception of how conductive their institutional environment is for them to be able to conduct research. The interview questions explore this further. Similarly the questionnaire uses Lewin's field theory (Lewin, 1951) which comments that both the person and the environment influences the behaviour of a person. The questionnaire has questions on both the individual's motivation and also the academic environment that they are a part of.

2.1.6.5 Goal Setting Theory:

Locke and Latham (1990) in their goal setting theory, criticises the previous theories for being too positivist and for measuring and analysing motivation by externalising or materialising its concepts. He comments that cognition, free will and consciousness should be considered as causes of a person's action and that introspection should be

used as a method of inferring psychological phenomenon such as motivation, self-efficacy and commitment.

When individuals perceived that the goals were impossible - rather than being challenging - their motivation decreased and consequently their performance. Also Locke (1996) reports that even for a boring task, if goals were set, the performance increased. Locke and Latham (1994) comment that satisfaction as a function of the difference between the individual's perception of outcomes and his expectations about the outcome. Works of Clements and Kamau (2017) and Chesney and Locke (1991) used goal setting theory and found positive evidence supporting it.

Questions were formed based on goal setting theory Locke and Latham (1990) in the questionnaire for both the academics and the Institutions. For the Institutions the questions included their focus on student results, their expectations from the academics in terms of their research productivity, the resources that were available at the institution, the support that they are providing for the academics in terms of offering time off to conduct research, attending Faculty Development Programmes etc.

2.1.6.6 Equity and Justice Theories:

Adam's equity theory (Adams, 1963) suggests that workers feel distressed if they presume that they are under or over rewarded compared to a similar person. This is similar to Relative Deprivation Theory by Crosby and Gonzalez-Intal (1984) which comments that an individual feels distressed when the reward they receive is less than the reward received by a similar person for the same input.

Equity theory explains the relationship between the employee's motivation and his perception of equitable treatment. Inequity creates tension and unpleasant feelings in

an employee and a desire to restore equity, motivates the individual to bring back the balance (Katzell and Thompson, 1990). The relationship can be simply expressed as,

$$\frac{\text{Individual's outcomes}}{\text{Individual's own inputs}} = \frac{\text{Relational partner's outcomes}}{\text{Relational partner's inputs}}$$

Bylsma and Major (1994) studied the sex differences in inequity perceptions. They found that both male and female subjects were more influenced by/ sensitive to the information (Pay or performance feedback) about same sex referents than the opposite sex referents. In contrast, Sweeney and McFarlin (2005) used social comparison theory and found that people compare themselves not only with similar (in occupation, within the same organisation etc.) others but also with dissimilar others. Also, that the information about the salary of dissimilar others also significantly affected the satisfaction level of the employees. Huseman et al. (1987) developed the equity sensitivity model to study the individual differences in inequity perceptions and classified people along a continuum of tolerance to inequity.

Later organisational researchers have used a 'justice theory' by Greenberg (1987) framework rather than/in combination with equity theory. In short justice theory states that the organisations/leaders should not only be fair, but also should be seen as fair. To be seen as fair, the leaders should attend to both 'Procedural Justice' (the fairness in the procedures used in the exchange) and 'Interactional Justice' (If the employee was treated with politeness, dignity and respect) (Ambrose and Kulik, 1999).

Justice theory has been used widely in understanding the motivation, absenteeism, trust and performance of employees. See the Meta-analysis by Cohen-Charash and Spector (2001) for a detailed review on Justice Theory.

In conclusion the Equity Theory fell out of favour as it failed to predict which type of behaviour is likely to be observed at the time of inequity (Ambrose and Kulik (1999). Also the works of Fey (2005) and Hofstede (1980) comment that perception of equity differs according to culture, which the original theory did not take into account. They comment that, for example, equity theory works well with a US sample, whereas it does not work whilst considering Israeli, Russian or Korean samples.

Questions based on Equity and Justice theories of motivation (Greenberg, 1987, Crosby and Gonzalez-Intal, 1984) were a major part of the interview, especially the secondary questions that were asked to the academics along with the actual interview questions as can be seen in appendix 7. The questions concerned about how the academics conducted research in a dishonest way and getting rewards such as getting a PhD getting monetary incentive promotions pay rice etc. and how it influenced their peers' perception of conducting research.

2.1.7 New faces in Motivation:

Ambrose and Kulik (1999) comment that the new faces in the theories of motivation are:

1. Creativity
2. Groups and teams and
3. Culture.

2.1.7.1 Creativity:

Creativity has become a major focus for organisations in the current, highly competitive environment. Stimulating, fostering and enhancing creativity has always been a major concern in every organisational and education systems (Agars et al.,

2012). Ambrose and Kulik (1999) comment that individual creativity is very much linked to motivational processes and it directly affects and is affected by the motivational practices. The following section shall look at creativity and its correlation with motivation and as a set of theories of motivation.

The importance of creative thinking on an individual and group level can be seen from the works of Karwowski et al. (2007) and Mumford (2000). Along with Agars et al. (2012) they stress the importance of developing strategies for recruiting, fostering and enhancing creative behaviour in leaders, employees and students.

In terms of goal setting theory and creativity, some of the major findings by researches include:

1. The presence of either a specific and difficult creativity goal or a ‘Do your best’ creativity goals enhances creativity.

2. When individuals with a “Do your best” creativity goal work alone and expect their responses to be evaluated (in an informational way and not as controlling), then the effects of positive goals are greatest (Shalley, 1995).

3. People with just creativity goals alone, or a creative goal with a ‘quantity goal’ performed better than if people were just given a quantity goal alone (Carson and Carson, 1993).

4. Creativity goals enhances the creativity of the individual/team but often at the expense of quantitative output (Shalley, 1995).

Martins and Terblanche (2003) comment that along with recruiting creative people, setting high standards for work performance and giving regular feedback the entire organisational culture must be set in a way that is conductive to creative behaviour.

Looking at the cultural differences, Rice (2006) comments on the differences in creativity between the western and the Egyptian cultures, similarly the work of Rudowicz et al. (2009) that reports the differences in creativity goals between a sample of Polish and Chinese students.

2.1.7.2 Culture:

Employees and people in general - are different from each other with respect to the cultures they come from Kirkman et al. (2006), Silverthorne (1992) and Hofstede (1980). So, any research on motivation should take into consideration the differences between various cultures where the work is located. Cultural differences are caused due to the peoples' way of living, their political system, economy, management style and history (Fisher and Yuan, 1998) and the different shared belief systems and shared values between different cultures influences their motivation in different ways as will be seen in this thesis.

Culture is a set of norms and social behaviour prevalent in human societies, the total way of life of people, their way of thinking, feeling and believing Geertz (1973)It is seen through expressive forms such as art, religion, music, rituals, technology, cuisine, clothing etc. It also includes the intangibles of the society such as the political and social organisation, mythology, and philosophy (Macionis, 2010). Lustig and Koester (2013) comments that culture becomes a part of the person's self-concept. He further argues that an individual's identity changes along with the various life experiences,

societal changes etc. When a person is cut off from that group, they feel alienated and try to identify themselves with another group of people.

Early motivational researchers were heavily criticised for focussing research mostly on the American population and trying to generalise their observations to other cultures. For example, even the mostly cited motivational theories such as Maslow's and Herzberg's were built upon data collected predominantly from the American population.

Henrich et al. (2010) highly criticises the almost exclusive usage of American and Western samples (terming the sample as 'WEIRD' – Western, Educated, Industrialised, Rich and Democratic) by researchers and trying to universalise the results. Their meta-analysis on the top journals in six disciplines of psychology shows that 96% of the target population for research were from western industrialised countries with 68% of them from the USA. Henrich et al. (2010) question how it is possible to universalise the results that are from such a narrow population of western society which forms only 12% of the entire world population? A similar argument is placed by Steers and Sanchez-Runde (2002) who comment that research on needs theory has focussed more on developed countries where the needs of the people are of a higher order and not in the lower order, whereas people of other countries and cultures might still be working towards their lower order needs.

A major reason for the recent increase in interest in this field is the phenomenal success and the re-emergence of economies such as India, China, other South-Asian countries and Brazil to become major global players. Also globalisation has created an environment where it is essential to work cross cultures (Bakthavatchaalam et al., 2011). A review of the social structure and the culture of Coimbatore, where this research is based is discussed in the section on 'Overview of Coimbatore'.

2.1.7.2.1 Hofstede's cultural dimensions:

Hofstede's cultural dimensions is one of the most cited works on cross cultural management. Hofstede (1980) defines culture as 'The collective programming of mind which distinguishes the group of one human group to that other'. The Cultural dimensions proposed by Hofstede:

1. Individualism vs. Collectivism,
2. Power distance,
3. Masculinity vs. Femininity,
4. Uncertainty avoidance,
5. Confucian vs. Dynamism (Long vs. Short term orientation).

Hofstede's work has been used as a framework for a multitude of research on various intra and inter cultural studies (Kirkman et al., 2006).

Some of the major criticisms on Hofstede include over simplification of an intricate aspect as culture into just five dimensions, generalising the data from IBM employees (they were the target population for the initial research) throughout and data collected from the 1970's still being used even though culture has evolved a lot in the meantime. For more detailed criticism on Hofstede, see (McSweeney, 2002).

2.1.7.2.2 Cross cultural management:

Cross cultural management has become a topic of major interest after globalisation. Sharma (2011) and Lovett et al. (2009) identified cultural empathy, open-mindedness, social initiative, emotional stability, cognition, social personality and flexibility to be few of the essential traits of international managers.

Bakthavatchaalam et al. (2011) studied the cross-cultural transfer of managers across subsidiaries. The research ranked the traits of an international manager being employed in a foreign subsidiary and found that the manager's positive attitude, adaptability and cultural understanding to be more crucial than knowing the local language. The need to maintain good communication with the HQ (Headquarters) was the main reason for appointing a person from the country where the HQ is based compared to a local person.

It should be noted that cultural differences play a major role in terms of understanding the work behaviour and attitudes of the employees and people in general. So, this should be included in the current research as an essential element of study. In this research it is seen as Elements of Cultural Identities (EoCI).

2.1.7.3 Groups and teams:

In the last three decades, there is an increased interest and attention to motivation in group settings (Ambrose and Kulik, 1999). This section shall look at group setting in terms of work design and goal setting. Group goal settings were an extension of the individual goal setting theory. In terms of motivation as a group setting, the following is a summary of the important points and findings in this area. Numerous studies including Cordery et al. (1991) and Wegge and Haslam (2005) report that semi-autonomous groups are more productive, creative, committed to the organisation and intrinsically motivated than traditionally organised work groups.

However, West et al. (2004) in their commentary argue that the 'Romance of teams' (which states that people perceive that teams are extraordinarily beneficial for performance) should not be accepted as such and requires more scrutiny.

Cordery et al. (1991) cautions that there was a high level of absenteeism and turnover in semi and fully autonomous groups with Pearson (1992) commenting that there is a clear necessity for role clarity and decreasing role conflict for increasing the intrinsic motivation in autonomous and semi-autonomous groups. In terms of how goal setting affects the group behaviour and motivation, it can be seen that the researchers have generalised the individual goal setting to the group level, but the underlying mechanism is more complex (Kleingeld et al., 2011).

This research is based on the theories of motivation and to identify and evaluate the various factors influencing the RP of the academics. In terms of the new faces of motivation this research extensively focuses on how culture influences the research productivity of the academics.

2.1.8: Social theory and motivation:

It is essential to understand that the 'Undeniably real' world that people inhibit in is a collective of cultural values, norms, believes and models of how to live that becomes transmitted to a person without awareness (Wedenoja and Sobo, 1997). Building on this, it is clear to see the interaction between the individual and the society in which s/he is part of and how the cultural factors influence their capacity to be research active and to be research productive.

There is an organic relationship between the personal, behavioural and the socio-environmental factors of a person that tend to influence what and how they strive for in their lives (Schunk and Usher, 2012). The Social Learning Theory by Bandura (1986) comments that a person learns by observing the environment. By such observations, they assess which actions to perform and which not to. This shows how the social and cultural contexts in which a person works and resides in influence their behaviour. As Schwartz (1997) points out that a person's personal values and motives

are usually mentally programmed by several factors such as their culture, religion, societal values, beliefs, feelings and goals. Thus the social capital a person is endowed with has a huge influence on their motivation and work culture (Lin, 2002). With Munro (1997) commenting that the conception of motivation and the conception of culture are strongly linked with each other.

Munro (1997) points out that psychologists studying motivation tend to focus on individual motivation and see culture as an agglomeration of individual beliefs, behaviour and values etc. Whereas anthropologists view culture as the central conception and that the individual motivation as a result of the larger society. In both the cases, the strong interlink between culture and individual motivation is clearly visible.

Kashima (1997) portray that a strong link exists between culture and how it influences motivation at an individual level. He comments that social groups that the individual belong to can both directly and indirectly influence the facilitation of an action, motivation or loafing. Belonging with a social group that is motivating or that facilitates a certain action results in the individual being motivated as well and visa-versa. This shows how people mirror or attempt to mirror the group they belong to. Munro (1997) comments that this is due to the person wanting to feel included within a social group and not to have the anxiety of being excluded. Studying the motives of Japanese and British populace, their work further elicits how the motives of the people are influenced by cultural values. So, it is important to study how the social culture and the societal values influence an individuals' motivation.

Even more interesting is the work of Kao and Sek-Hong (1997) which looks at how the shared meanings within a social context are different from place to place and how these changes influence an individual's motivation. They comment that whereas in the western countries 'Personal satisfaction' and 'individuality' are the major work

motivators, in the eastern countries the motivation is borne more out of a moral commitment to the group to which they belong.

Sinha (1999) comments on the influence of western ideas to be strong on non-western countries. This he argues is due to these countries considering that the western practices are universal and the best path towards economic development and industrialisation. He further comments the need for management systems that diffuses western ideas and the local cultural values, local conditions and circumstances.

Kao and Sek-Hong (1997) argue that hybrid motivational systems should be developed that embraces both capitalistic and the community-oriented principles. They comment that rather to importing motivational principles from other countries, each of the countries should try to formulate and version their practices that builds on their traditional values.

2.1.8.1 Linking social theory to the current study:

Relating the principles of social theory to this research, this section emphasises how the RP, or the capacity to be research productive is influenced by the social structure that the person operates within.

Social theory has a lot of implications for this research. It is essential to explore how the cultural values and the societal structures a person is a part of to influence their RP. A detailed view on the Indian cultural scenario and its social structure is given in section 1.4.3. For instance, in a particular culture, if there is less female participation in academia or in research, then it would be different to a culture where female participation in research activities is considerably higher. If AD is more prevalent in a certain academic system, then the research produced might have lower value than that of a research produced in an academic system with little AD. From the literature, no papers were identified that were written in India (see section 2.2) that looked at the influence of cultural values on the RP of the academics. Since no research has

explored this area, this research explores if the academics' RP is influenced by cultural values (quantitatively) and if so, how (qualitatively) they influence the RP.

The questionnaire has a complete section on the indigenous factors which were identified from the pilot interviews as being a pertinent factor that influence academics' RP. Questions such as them being in academia as a God given duty, reincarnation, auspicious time, astrology and divine merit etc. are a few indigenous elements that are not found in the Western motivation theories. The questionnaire also includes Likert scale questions on collegial work environment, which directly links to theories on 'Groups and teams'.

2.1.9 Discussion:

In summary, this chapter has looked at the various theories of motivation and the major arguments in them. The chapter has discussed the important factors in the theories and their limitations. This chapter has also looked at the relevance of the motivation theories and how they are explicitly related to this research and the questionnaire.

This section will try to form a pattern of the evolution of the various theories that try to explain motivation in the workplace. Since the earliest centuries, people have been discussing philosophically what motivates a person. Empirical studies on motivation began in the late 1800s when the SMT was used to simplify the job and to better reward their workers for their effort. After the shortfalls of such mechanist methods were felt, the more humanistic theories evolved. Motivation theorists started looking at an employee as a complex being with multiple needs. The theories on motivation then focussed on identifying, organising the needs of the employees. Later the cognitivist theories came into existence, which combined the principles of psychology in

identifying and analysing organisational behaviour. Later on, research looked at how equity and goals affected motivation. Then focussing on group rather than individualistic motivation.

Exploring at the studies looking job satisfaction, research motivation and research productivity in India (Bakthavatchaalam et al., 2013) found Herzberg's theory was used popularly followed by Maslow. No study has looked at how cultural factors or how issues that are particular to India influence the academics motivation. This is a gap in the literature that needs exploring.

2.1.9.1 The need to include cultural dimensions in studying motivation:

The omission of cultural differences whilst forming the theories of motivation has been identified as a major flaw of the earlier theories. This is because culture has a huge impact on the various elements of people's lives, it influences their shared belief system, their values and their social interactions. The culture can also be the organisational or the institutional culture. This will have a huge impact on the motivation of the academics to be research productive. This is explored more in the discussion section.

In the future, when theories are to be formulated, localising them to suit the culture where it will be applied should be considered, rather than universalising the theories to all cultures. To fill this gap, this research will use 'Cultural factors' along with other factors to explore the research questions.

Section 2.1 has looked at the prominent theories of motivation, their relevance to the hypotheses and the questionnaire. the next section 2.2 will provide an overview of the Indian Higher Educational System.

2.2 Research Productivity, meta-analysis and the need for research:

Chapter 2.2 is divided into three sections. The first section explores the literature on the various factors influencing the RP of the academics. The chapter will also try to directly link the literature with the hypotheses (as seen in Chapter 4.1.5) for this research, thus showing the rationale for forming the hypotheses. This is followed by a meta-analysis on the various studies that have been conducted in India on this area. Based on the meta-analysis, the third section brings together the need for research.

2.2.1 Factors influencing academics' motivation to conduct research:

This chapter 2.2.1 will look at what Research Productivity (RP) is and the various factors that influence it both positively and negatively. This research takes into consideration the individual and the environmental variables that influence RP. This research will look at it based on the demographic factors, personal and professional factors, organisational and institutional factors, changing environment and other relevant factors. These form the basis for the questionnaire (see appendix 6).

This chapter cites a large amount of literature based on non-Indian studies because initially only literature based on Indian studies were considered, but there were very few studies available on this area as can be seen from Bakthavatchaalam et al. (2017a) and Bakthavatchaalam et al. (2013)) and the need for research section (Section 2.3.2) of the thesis. So, literature based on foreign studies were also selected. Also, as factors influencing the RP of the academics change over time, this chapter shall mostly focus on the literature after 1990.

2.2.1.1 Research Productivity:

Research Productivity (RP) is a measure of conducting and publishing research (Abramo and D'Angelo, 2014, Hirsch, 2005, Zamarripa, 1993, Ramsden, 1994). As Fox (1983) points out that any research activity becomes tangible only when they are communicated by publication or its equivalent, with publishing and sharing results being the fundamental social interaction of academia. RP is an accumulation of different research activities including: publishing papers at national and international levels, books, chapters, monographs, newspaper articles, securing grants, supervising research students, serving as a peer reviewer, being an editorial board member, offering presentations, lectures as a guest speaker, contributing to national, international level committees, filing patents etc. (Wootton, 2013).

Academics are the key resource and means of RP and also play a pivotal role in the institution achieving its objectives in teaching, research and their wider social contribution (Machado-Taylor et al., 2014, Machado-Taylor et al., 2011). As RP being seen as one of the crucial elements for promotion, pay rises, securing funds and also for institutional ranking and obtaining research grants etc. (Garwe, 2015, Ogbogu, 2009, Carayol and Matt, 2006, Ramsden, 1994), thus it becomes important to identify the various factors that influence both positively and negatively the RP of academics.

2.2.1.2 Determinants of RP:

The determinants of RP are many and complex (Ramesh Babu and Singh, 1998). This is evident from the works of Subramanian and Nammalvar (2017), TimesHigherEducation (2016), Jasmine et al. (2011), Smeby and Try (2005), Prpic (2002), Bonaccorsi and Daraio (2002), Sax et al. (2002), Clark et al. (1996) and Allison and Stewart (1974) who look at the various factors influencing the RP of academics such as their age, gender, type of institution they work in, the size of the research

group, the culture, the research environment, colleagues' research work to name but a few. Fox (1983) classifies the determinants of productivity as individual level variables, environmental variables and feedback processes. This chapter shall look at the literature on the factors that influence the RP of academics.

Along with exploring the literature, this chapter ensures that all the hypotheses formed (as seen in 4.1.5) and the questions in section 2 of the questionnaire are linked with the literature. There was an option to move all the hypotheses to this chapter, but it will result in their repetition in chapter 4.1.5. The researcher rationalises that the hypotheses being in 4.1.5 is better as it would be logical to state and test them in the same section, rather than having them in two different sections.

2.2.1.2.1 Demographic factors influencing RP:

The influence of demographic factors such as age, staff qualifications and composition of the academic staff have been studied over the last two decades but with differing results (See: Adams and Clemmons (2009), Abbott and Doucouliagos (2004), Dundar and Lewis (1998) and Ramsden (1994)).

In terms of gender, Hunter and Leahey (2010) and Kyvik and Teigen (1996) point out the huge difference in the RP of male and female academics, commenting that women academics with young children and their lack of research collaboration are two major reasons for them to lag in RP. This is supported by the works of Prpic (2002) who reports that young female academics publish on an average of two papers less than their male counterparts early in their career. Subramanian and Nammalvar (2017) studied the RP of Speech and Hearing faculty in India and once more found that men publish more than women. Richards (2006) reports that publication was positively associated with advancement for both the genders, with men with children and married men advancing quicker than single or men with no children, whereas motherhood was

associated with difficulties in advancement for women assistant professors. The reason for this, the researcher supposes that child rearing for a female academic takes up time, which affects the male academics comparatively less.

Aksnes et al. (2011) report that for all age groups, male academics were more productive than females. However, in a later research, Rørstad and Aksnes (2015) comment that it is only until 55 to 59 years that men publish more than women and after that women have higher publication rate. They also state that position in the institution is a better reflection of RP than gender or age group. Smeby and Try (2005) also reported that males publish more than females, whereas in terms of Job Satisfaction (JS), most researchers and articles agree that female academics are more satisfied than their male counterparts (See: Katoch (2012) and Karthik and Velavan (2012)). But the problem with Karthik and Velavan (2012) is that only 8% of the respondents were female and the paper by Katoch (2012) does not offer any qualitative reasons why female academics are more satisfied. A future research should look at the job satisfaction in terms of genders and age groups qualitatively in the target institutions.

Especially in Science, Technology, Engineering and Mathematics (STEM) subjects it is common across most nations to have gender inequality in participation, with male members being more numerous than females. This shortage of female role models might also influence the research output of female academics. Since the results on the influence of gender on RP are muddled, and since there is an absence of empirical data from south India exploring this, it becomes essential to study if and how gender influences the RP of the academics. To explore the influence of gender and marital status on the RP of the engineering academics in Coimbatore, hypothesis 1 (see: 4.1.5.1) and hypothesis 2 (see: 4.1.5.2) were formed.

2.2.1.2.1.1 Influence of age group on the RP:

Age group of academics is found to be a major influencing factor on their RP, with Aksnes (2012) reporting the relationship between that RP and age as “U shaped”. Similarly, Subramanian and Nammalvar (2017) found that RP peaking at two different age groups, the initial peak being at an age of less than 30 years old and the second peak, which is higher than the first occurs with the age group of more than 55 years. In between these age groups RP reduces. However THE (2016) reports that academics in their mid-career usually are more productive. Adding to this, Jones and Weinberg (2011) comment that the academics make their greatest achievements in their late thirties and early forties, with 40.2 being the age for Chemistry, 39.9 for Medicine and 37.5 for Physics. Gingras et al. (2008) report that RP declines for academics after the age of 50, but if they choose to remain active in research, then their productivity may be high until 70, as they do not have any teaching or administrative duties.

Bonaccorsi and Daraio (2002) comment that higher the age of the researcher, the lower the RP but Ebadi and Schiffauerova (2016) suggest that career age or the level of teaching experience is positively associated with RP, especially for those with industrial affiliations. However, Gonzalez-Brambila and Veloso (2007) comment that age does not influence RP, they also point out that that academics in senior positions bother more about the quality than the quantity of publication. TimesHigherEducation (2016) suggests that the age of academics does not influence their RP as much as their motivation and ability to conduct research. In terms of the JS of academics with respect to age is reported to be U-shaped and that again women are more satisfied than men as commented by Gazioglu and Tansel (2006) and Clark et al. (1996).

Overall, there is no clear agreement on the influence of age on RP, this may be because that the studies are conducted in different countries with differing cultures.

However it is considered important to get an understanding of any influence age might have on RP, as Subramanian and Nammalvar (2017) suggests, teaching and research loads might be better distributed in accordance with age group. In order to better understand how the age group of the academics influence the RP of the target academics, hypothesis 3 (See section 4.1.5.3) was formed. Also following the results from Ebadi and Schiffauerova (2016), it is important to see if industrial affiliations or industrial experience has an influence on the RP of the academics. To check this, hypothesis 10 (See section 4.1.5.10) was formed.

2.2.1.2.1.2 Influence of the position in the institutions on the RP:

There was higher teaching motivation among the academics with U.G. degrees, those with low RP and women. Whereas, associate professors, professors had higher research efficacy (Bender, 2006) and that position in the institution has more impact on RP than age or gender. Ogbogu (2009) also shows the RP increasing with the position. One of the major reasons why professors have a higher rate of publication is that their name is mentioned in all the research work of groups which they are heading, whereas for a PhD student or a new lecturer, his name is mentioned only on the research in which they are directly involved (Rørstad and Aksnes, 2015, Aksnes, 2012). Even in terms of satisfaction with research Oshagbemi (2000) shows that academics with higher rank are more satisfied than their counterparts. In order to check the RP of academics with different position in the institutions, Hypothesis 6 (See section 4.4.5.6) was formed. Similarly, in section 2 of the questionnaire (appendix 6), questions relating to the position, wanting to get promoted/recognition and career progression and the associated pay rise (q.no. 8, 9, 10, 12, 37 and 39) were formed to evaluate their influence on the RP of the academics.

In terms of the age of the institutions, Bonaccorsi and Daraio (2002) report that higher the age of the institution, lower their RP. In Coimbatore, from the researcher's experience, it was evident that older institutions, were more established and focussed more on research, compared to the newly founded institutions. In addition, older institutions had either a 'Deemed' university status or they were 'Autonomous' institutions, with more academic freedom compared with the newly founded institutions which mostly had an 'Affiliated' status. The literature showed no studies looking at the differences in the RP of academics in different types of institutions based on their age and their status. So, to test if there were differences in the RP between the institutions of differing status and age, hypotheses 4 and 5 were formed (See section 4.1.5.4 and 4.1.5.5).

2.2.1.2.1.3 Other Demographic factors:

Other demographic factors that influenced RP include marital status, religion, lecturing hours per week etc., (Ogbogu, 2009). Other factors associated with RP include time spent on research (Brocato and Mavis, 2005), research experience (Callaghan, 2015), having a degree abroad (Sahoo et al., 2017) and having a PhD (Murray, 2014). With Aksnes (2012) commenting that academics with a PhD or working towards it have higher RP than those who are not. The literature did not show any studies conducted in South India that looked at how the degrees achieved or working towards influenced the RP of the academics. Though the researcher supposes that academics with higher degrees or those working towards one would have a higher RP, there were no quantifiable evidence. In order to explore if the degrees the academics had obtained or the degrees that the academics were working towards influenced their RP positively or negatively, hypotheses 12 and 13 were formed (see section 4.1.5.12 and 4.1.5.13).

Following from Sahoo et al. (2017) From the researcher's experience, it is evident that most of the engineering HEIs were located outside the city limits. To ensure that the students and the academics reach the institution on time, the HEIs usually operate their own buses exclusively for the use of students and academics. Even with these buses, it takes approximately an hour to an hour and a half to commute to the institutions from the city. While a few students and academics use self-transportation, the college buses are the mostly used mode of transportation. Since the laboratory resources are within the institution's campus, common sense shows that academics who choose to stay within the campus/ institution's lodging for the academics, or those who are closer to the institution to have higher RP than those who live further away. But there is no empirical data available to test this. So, to explore the differences in the RP of the academics at various distances from the institutions, hypothesis 16 (see section 4.1.5.16) was formed.

These are few of the demographic factors stated by the literature to be influencing RP. On the contrary, Okonedo et al. (2015) in their study of the Nigerian librarians, found that demographic factors do not influence RP.

2.2.1.2.2 Personal and Professional factors:

In the modern Universities, both teaching and research is a compulsory part of being an academic (Arimoto, 2014), with conducting research, advancing knowledge and publishing the results is seen as the crux of any Higher Educational Institution (HEI). But the RP of the academics depend on how they focus on each of these duties. Academics spending more time on research end up producing more publications than those who spend time with teaching related activities. This is supported by Brocato and Mavis (2005) who suggest that the time spent on research influences RP

positively. Whereas Toutkoushian and Bellas (1999) point out that reducing teaching or institutional services does not always equate to more research productivity.

2.2.1.2.2.1 Influence of time allocated for different duties on RP:

Even though Neumann (1992) identified a symbiotic relationship between research and teaching of academics with both positively interacting with each other, Fox (1992) suggests that time and effort invested for teaching and research do not go hand in hand and that they are not aspects of the same dimension and that academics who invest more time in research have higher RP than those who focus on teaching. So, time allotted for academic duties such as teaching and administrative duties becomes important to study in terms of their influence on the RP. A range of literature referred comment on the lack f time for the academics to conduct research and that they have had to spend more time on teaching and administrative duties, thus impeding their research. This is also reflected in the interviews (see appendix 2 and 3). Brew et al. (2017b) comments that it is important that while considering the duties of the academics, not only teaching and research but also all the other duties they do for the effective functioning of the Universities must be considered. .

To quantify how the time allocated for different duties influence the RP of the academics, Section 4.1.5.17 explores how the % of teaching and teaching related duties, paperwork related duties, student monitoring and time allocated for research influence the RP of the academics. To identify if the time allocated for teaching duties and overall if the working hours per day influenced the RP of the academics, hypothesis 14 and 15 were formed (see section 4.1.5.15 and 4.1.5.16). Likert scale questions were specifically formed in section 2 of the questionnaire (questions 13, 24

and 25) to assess the importance of different duties, time allocated for research on their RP.

2.2.1.2.2.2 Influence of pay scale on the RP:

Pay scale is an important element influencing the RP, with Agarwal (2006a) and Sharma and Jyoti (2009) showing the importance of proper pay for job satisfaction of the academics. In addition, Lindner (1998) comments on the importance of proper pay for a motivated academic workforce. Also Aksnes (2012) finds that academic position and salary are positively correlated with RP.

Importance of pay is not usually agreed upon in academia, even if RP is influenced by intrinsic factors, pay is an essential “hygiene factor” that needs to be managed carefully. Rynes et al. (2004) comment that managers tend to underestimate the importance of pay which ties with the interviews from the managers. It may pose particular problems associated with the huge increase in the numbers of HEIs in Asia. Most of these private institutes completely depend on the fee of the students to pay the lecturers and so, if they are unable to recruit enough students, then they cannot pay their staff properly. In order to explore the influence of pay on the RP of the academics, hypothesis 9 (see section 4.1.5.9) was formed.

2.2.1.2.2.3 Influence of motivation and self-efficacy on RP:

In terms of motivation, interest and self-efficacy, Horodnic and Zait (2015) point out the positive correlation between academic motivation and RP, commenting that the academics who are motivated by internal factors are more productive than those influenced by external motivators. Looking at what motivated the academics, Castillo and Cano (2004) found that academics were most motivated by ‘work itself’ and least motivated by ‘Working conditions’. Callaghan (2015) shows that self-efficacy to be the

major predictors of RP, where academics who show more self-efficacy being more productive.

Brew et al. (2015) comment that the RP of the academics vary according to the perception they have of themselves as a researcher. They also found that those with a PhD, doctoral students and those who had high RP values had a stronger view about the particular ideas of research. Persistence, capability to learn, initiative, creativity, intelligence, are some of the other indicators associated with self-efficacy that are reported to be impacting the RP (Ramesh Babu and Singh, 1998). Similarly, looking at PhD students, Kahn and Scott (1997) comment that interest in research as an important predictor of RP. The importance of interest and self-efficacy is shown by Tien and Blackburn (1996), Gelso et al. (1996) and Ramsden (1994). To test the influence of academics' self-efficacy / confidence, interest, their own perception as a researcher and motivation on their RP, questions on 'Personal factors' were formed in sec. 2 of the questionnaire.

2.2.1.2.2.4 Influence of promotion on the RP:

Looking for promotion is seen to be another important indicator of RP, with academics conducting research in order to get promoted to a higher position or to get a tenure. The importance of promotion and/or such reward mechanisms are shown in the works of Bland et al. (2005), Marsh and Hattie (2002), Toutkoushian and Bellas (1999) and Tien and Blackburn (1996). All these works agree the importance of promotion influencing the RP. To test the influence of promotion on their RP, questions 10 and 37 were formed in sec. 2 of the questionnaire.

2.2.1.2.2.5 The influence of position and accumulated advantage on the RP:

With regards to the position of academics, the concept of accumulated advantage, dubbed the 'Matthew effect' - as shown by Allison and Stewart (1974) to be playing a major role in the RP of the academics, with more established and experienced academics having more contacts, networks, recognition, feedback and resources will improve or maintain their RP, where as those with less accumulated advantage and less experience will produce even less with time. Abramo and D'Angelo (2014) comment on a correlation between academic rank/position and RP. Powell (2015) suggests the importance of job security for academics especially postdocs to encourage them to stay in the profession and thus become more productive. Also, the commitment to the institution and the JS are severely affected by Job insecurity (De Cuyper and De Witte, 2007), suggesting its influence over RP. In order to check if the RP varied with the academic experience, hypothesis 8 (See section 4.1.5.8) was formed.

2.2.1.2.2.6 Influence of working conditions on the RP:

Saglam (2008) comment that basic working conditions should be given importance. This is supported by Santhapparaj and Alam (2005). Job security, higher rank, position and salary are reported to influence RP positively (Sax et al., 2002, Ramsden, 1994). In terms of satisfaction, Chen et al. (2006a) report that out of 39 factors they considered, good salary, job security and fair promotion were the major concerns the lecturers. Lindner (1998) comment that interesting work is a major element to motivate an academic workforce in both teaching and research. Similarly, Jeans and Murphy (2009) comments on carefully managing the intrinsic and extrinsic factors (from Herzberg's two factor theory) as the academics can be demotivated by both the factors.

Overall, with regards to personal and professional factors: self-motivation, efficacy, interest in research, wanting to establish themselves, their perception of being a researcher, job security, pay, career progression/promotion and rewards etc. are reported as impacting on RP. Question 11 in section 2 of the questionnaire was formed to explore the influence of job security on the RP of the academics.

2.2.1.2.3 Collegial and institutional factors:

Collegial and institutional factors can have a huge influence on the RP of the academics. Collegial factors such as belonging to a research group, quality of the colleagues' publications, networking and receiving mentorship, intensity and the quality of colleague's research etc. are reported to influence RP by Carayol and Matt (2006). They also report that the institutional support in terms of flexible timing, facilities and their vision influence the academics' RP.

Similarly, institutional factors such as availability of research funding, vision of the institution, adequate research facilities and access to journals (Dundar and Lewis, 1998), labs and financial support for going to conferences are seen to influence RP.

Working with colleagues who are research active and publish more influences the academics' RP as well, with Mairesse and Turner (2002) commenting that the quality of publications of the colleagues influences the RP of the academics, with their RP being directly proportional to that of the group's.

Belonging to a group that is well equipped in both research and human resources was found to result in higher research productivity by Antonio-García et al. (2014) in their investigation into Bio-medical researchers. Institutions should have adequate facilities for the academics to conduct research, or at least should have access to other institutions where the equipment are available. The literature found no studies that looked at the RP of academics from different departments. So, to enrich the

discussion, the researcher formed hypothesis 7 (see section 4.1.5.7) to identify if different departments had varying RP, which not essentially, but perhaps in turn be reflective of the collegial environment.

In terms of the availability of journal articles, with Altbach (2015d) and Forest and Altbach (2006) comment that most of the journals are controlled by large multi-national publishers who charge a heavy fee for access. It might not be possible for academics in developing countries or for their institutions to pay these huge fees.

In terms of the institutional culture influencing the RP of the academics, Kao and Sek-Hong (1997) comments on how the workplace culture influences a person's motivation. If a person has colleagues who are conducting more research and publishing, it has a positive effect on the individual's RP as well. The works of Macionis (2010) can be used to explain this influence as he comments that an individual tries to mirror the existing group's culture and values for fear of being left out. Whereas if the colleagues are research dormant, then the new colleague also produce little research. This shows the importance the institutional culture has on RP and how research is conducted. As Lustig and Koester (2013) comment, culture (institutional or otherwise) becomes a part of the person's self-concept. Pratt et al., (2006) sustains that to build a research culture in an institution, there needs to be a strong leadership, and a commitment to bringing a research culture.

2.2.1.2.3.1 Influence of institutional support on the RP:

Similarly, receiving mentorship (Cohen et al., 2012), being given the opportunity to attend faculty development programme to improve their skills (Quimbo and Sulabo, 2013) and networking with other academics are shown to be more conductive to RP (Brocato and Mavis, 2005).

Aksnes (2012) reports that academics who are backed up by PhD students and assistants or those who are leading a research group are more productive than the ones conducting research on their own. This is because, academics with PhD students under them often distribute to their students time consuming tasks such as data collection and sorting and just focus on analysis and publishing.

Academics from top institutions and those with previous experience as research assistants were more productive than their counterparts (Buchmueller et al., 1999). Murray (2014) comments that working in a large institution has a positive impact on the RP but Carayol and Matt (2006) found that the size of the laboratory is negatively related to RP. The presence of foreign academics or postdocs in the institution or the research centre increases the RP. Bonaccorsi and Daraio (2002) identified no difference in RP based on the size of the institution, which is surprising. Based on the literature and the pilot interviews, questions on 'Organisational factors' were formed in sec. 2 of the questionnaire to test the influence of collegial environment facilities available and institutional support on the academics' RP.

2.2.1.2.3.2 Influence of funding on the RP:

Funding is seen to be important predictor of both the quantity and quality of RP (Ebadi and Schiffauerova, 2016) with well-funded research teams and institutions being more productive than those stifled for funding. This is supported by the works of Itagaki and Pile-Spellman (2005).

Similarly, top management support is overwhelmingly important to increase the RP, with Beerkens (2013) and Conn et al. (2005) commenting the role the management must play in increasing the RP of an aspiring institution.

Allocation of proper funds for research and top management support in terms of availability of leave, sabbaticals, travel funds etc. goes without saying is an essential

element in improving RP and the motivation to conduct research as seen from Nguyen et al. (2016), Taylor et al. (2006) and Dundar and Lewis (1998). Overall, academics' dissatisfaction with the top management and its support for research is shown to result in staff turnover, job stress and burnout (Pienaar and Bester, 2006, Chen et al., 2006b) let alone low RP.

2.2.1.2.3.3 Influence of collaboration on the RP:

Quimbo and Sulabo (2013) and Smeby and Try (2005) discuss the importance of collaboration for increasing RP, with academics who collaborate with international peers being more productive than their counterparts. This is a problem in India, as Arif (2015) in his review of the top institutions in India show a very low international collaboration, with only 2% of the reviewed papers co-authored with an international peer. This is something that needs investigation. Question 13 in section 3 of the questionnaire was formed to test the influence of international collaboration on the RP of the academics.

2.2.1.2.3.4 Influence of other professional factors on the RP:

The importance of providing mentorship, effective leadership, faculty development skills and networking in the increasing the RP is seen from the works of Brocato and Mavis (2005).

The time spent on various duties and the RP shows that when the institutions allocate more time for research for their staff and when the staff spend more time on research related activities, their RP increases (Hancock et al., 1992). The importance of good leadership in improving RP and the organisational culture can be seen from Paviyutkin and Yudkevich (2016),Taylor and Machado (2006) and McCaffery (2010) with Munir et al. (2012) identifying a direct relationship between a transformational leadership and

the job satisfaction of the academics. Brew et al. (2017a) comments that in order to form policies, it is important to understand how the academics orient themselves to their own jobs, their surroundings and their goals and purposes that they wish to fulfil. Finally Bland and Ruffin (1992) in their review found a set of 12 characteristics of a research conductive environment to increase the research produced by the academics. They include: Having clear goals for co-ordination, research emphasis, positive group climate, sufficient size, age, and diversity of the research group, appropriate rewards, frequent communication etc.

2.2.1.2.4 Governing bodies and policies:

HEIs are not immune to the wider changes that are happening such as massification of HE system, internationalisation, increased accountability and use of technology (Lindner, 1998). The research policies set by the governing bodies, the policies adopted and dictated by the Government, popular trends, distribution of funding to institutions at different tiers, national research priorities, governmental policies, the % of GDP allocated to research – all of them have an impact on the RP of the academics and how HEIs operate (Diogo et al., 2015, Rani, 2010)

2.2.1.2.4.1 Influence of local, national and international policies on the RP:

Looking for evidence of policy changes influencing academia, the works of Frolich and Caspersen (2017), Manatos et al. (2016), Paviyutkin and Yudkevich (2016), Diogo (2015), Amaral et al. (2009) and Taylor and Machado (2006) look at an international context and comment on how policy changes driven by the growth of quality assurance, political situations, global competition, the changing role of governing bodies, global rankings, national level and international initiatives etc. influence the priorities and the behaviour of HEIs in general. Government and research spending

policies and their importance to increasing the quantity and the impact of research are reported by Vlasceanu and Hancean (2015).

Widmalm (2013) comments about the changes in Swedish research policy and how its' quantitative measures and the social impact the research is expected to create has had an influence on the RP of its academics. She also comments that this is similar to the Research Excellence Framework (REF) system currently adopted in the UK. Based on the literature and the pilot interviews, questions on 'Governing/External bodies' were formed in sec. 2 of the questionnaire to test the influence of governing bodies and policies on the academics' RP.

2.2.1.2.5 Influence of external factors on the RP:

Industry, commerce and businesses will all attempt to influence the University and its working (Massy, 2006). For instance, Hyvonen (2012) comments about the policy of integrating the regional institutions and industries in Sweden where academics were funded and expected to produce courses and research based on the needs and interests of these industries has produced mixed results.

Bennich-Bjorkman (2007) looks at how the changes in funding policies and the increasing emphasis on teaching has dented academic freedom and that such institutional changes have affected the behaviour of the academics and their research work. Not only formal policies but also the popular trends which ultimately become informal policies tend to influence academics, their view of research, the anticipated outcomes of a research programme and the timescales to produce them (Bennich-Bjorkman, 2012) further talks about the perils of the increasingly popular trend of industrialising academic research and how it might destroy the preconditions for original research; discovery and innovation.

2.2.1.3 The Indian Scenario:

In terms of developing countries, (Altbach, 2015d, Forest and Altbach, 2006) point out that most of the institutions are teaching institutions and not research based. This is the scenario in India as well, with most of the institutions focussing on teaching. However, currently, there is a shift in emphasis in Indian institutions from teaching to research and to trying to become a knowledge hub. This change in emphasis can be seen from the introduction of the National University Rankings, Academic Performance Indicator scores etc., in which research is given considerable importance (NIRF, 2015). Emphasis on research in India is also being driven by the fact that none of the Indian HEIs featured in the top 200 institutions of the world (Kumar and Dash, 2011) and the same was reported in 2017 (TimesHigherEducation, 2017) showing that the rankings of the Indian institutions are yet to reach the top 200.

2.2.1.3.1 The changing academic environment in India:

A prime example of policy changes affecting HE in India is the economic liberisation in 1990s and the founding of so many HEIs (mostly private) in India. Also, The NIRF ranking system, API scores that have been introduced by the MHRD are reported to have increased the quantity of the publications at the expense of quality from the pilot interviews. But this is something that should be studied in detail.

Privatisation of HEIs as reported by Rani (2010) is another example of the policies of the governing bodies influencing RP, she comments that overall, there has been a shift of the academic system from being more socialist to that of a capitalist one, influencing how the academic system is conducted and the expectations from the academics

The CAE in India varies across the country. Focussing on the changes in academia and its potential influence on the academics' RP, commodification of education (Chakrabarty, 2016, Rani, 2010) , the increasing demands of the institutions from the academics such as wanting more publications (NIRF, 2015) giving the academics more administrative work (Das and Gujrati, 2013), having a high teaching load, expecting the academics to work during their free time on their research, the declining status of being an academic which once was viewed with a lot of reverence (Altbach, 2009, Altbach, 2003), the HEIs traditionally are seen as a place of social and moral development and a beacon of knowledge (Kapur and Mehta, 2004) and now them having become more of a money-making machine is a huge change (Sinha and Sinha, 2008c, Heslop, 2014).

Another change is the interplay between the increase in the number of engineering institutions, students' declining interest in taking up engineering and as a result having a lot of vacant seats (Sujatha, 2018, Council, 2017, Sujatha, 2017). Until the boom in the number of engineering institutions, getting into an engineering institution was very competitive whereas now the supply outweighs the demand, this has really lowered the entry requirement for the students to enter engineering. How do the institutions cope with it and how it influences their RP is to be seen.

Not only the national policies and agendas influence academics and their research, even International bodies and their policies do so. For instance, UNESCO and its institutions currently emphasise the implementation of the Sustainable Development Goals (SDG) in which sustainability related research is seen to be important (UNESCO, 2017), such policies and the funding it offers can influence an academic to choose a particular research topic. The private funding bodies have also started requiring that the proposals sent to them align with the SDG. Even the researcher has developed a new research interest thanks to the SDG: 'Integrating sustainability in

curriculum through digital education'. This has been done in hopes of securing a UNESCO funding and eventually to secure employment with them.

Based on the literature and the pilot interviews, to test the influence of the changing academics environment on the academics' RP, questions 22, 23, 26 and 27 were formed in sec. 2 of the questionnaire.

2.2.1.3.2 Indigenous factors and culture:

The influence of cultural and religious values on the productivity of workers is based on Weber's 'protestant work ethics' based on the principles of protestant religion such as honesty, hard work, striving for professional development, discipline, responsibility etc. (Altynbekov et al., 2013, Forson et al., 2013) and so is not a new thinking. However, very few studies have looked at the influence of cultural and religious determinants with empirical data (Kaasa, 2016). The importance of understanding cultural differences between different countries and the consequences of generalising across cultures can be seen in Kirkman et al. (2006), McSweeney (2002), Søndergaard and Hofstede (2001) and Hofstede (1984) with Graham et al. (2016) commenting how cultural elements influence the moral judgements of people. So, it is important to study how cultural factors and belief systems influence peoples' behaviour, in this case the RP of the academics.

2.2.1.3.3 How the indigenous factors were selected for this research:

This section discusses what Indigenous factors / Elements of Cultural Identity (EoCI) are and how they were formed for this research. Cultural identity is the sense of belonging a particular individual feels with any specific group or culture. By identifying with a specific culture, the individual learns and accepts various elements of the culture such as the group's religion, norms, the social structure, language, traditions,

aesthetics, music and arts and ancestry (Hall and Du Gay, 1996). In terms of this research, all these elements influence / constraint how a person thinks and acts and in turn their RP. Looking at the literature, it was observed that no research has looked at the influence of these factors on the academics' RP in India.

In this research, no particular definition was used for EoCI / Indigenous factors. The generic description that was used for EoCI or the indigenous factors was that these are the factors that are particular to India and were formed from the pilot interviews. This is similar to how Hall and Du Gay (1996) Ennaji (2004) view cultural identity. In essence, this is not a definition and also this research does not seek to define EoCIs. Indeed, there might be several other Elements that influence cultural identity such as language, caste, arts and music, cuisine, dressing etc. Hall and Du Gay (1996) which have not been studied in this research, but this research only uses only those factors that were identified as influencing RP from the respondents' comments during the pilot interviews.

It is easy to see how easily the terms 'Elements of Cultural Identities' (EoCI) and 'Religion'/ 'Religious codes' could be viewed as interchangeable in this research, especially for a stranger to the Indian scenario. In this research, EoCIs and religion are not interchangeably used. Indian civilisation being one of the oldest in the world, it is difficult to identify if religion is a part of cultural identity or if cultural identities sprang from religion. But it should be noted that even though, most of the cultural identities have roots in religious principles (Respect to elders, a consideration that teaching is noble and family values etc.), they have become a part of the social practices regardless of peoples' religious beliefs. From the above perspective, it is easy to presume that EoCI in India can be traced to the principles and practices of Hinduism, the major Indian religion.

2.2.1.3.2.1 Absence of empirical research:

There was no empirical research based in India that the researcher could identify that explored the influence of indigenous factors on the RP that could inform the questionnaire (See appendix 6). However, the importance of indigenous factors influencing RP was observed from the pilot interviews that were conducted. Note that these pilot interviews do not form a part of the data used for the results and analysis. During the pilot interviews, the respondents were asked to comment on what they thought were the cultural elements that had an influence on their RP. The replies included comments which were indicative of both religious and non-religious elements. Religious elements included: conducting research as a moral duty, for attaining divine merit, for a better reincarnation, seeing it as a God given duty, astrology, auspicious time, and Vaastu saastram. Non-religious elements included having a better husband / wife if they did / did not conduct research and being motivated by wanting to be a role model to the society. These were used in the questionnaire to collect quantitative data. Though difficult to generalise, the EoCI of Coimbatore would be very similar to that of South India. But how generalisable the identified EoCI would be other parts of the country is questionable.

From the pilot interviews, being a role model was seen to be an important motivator, some of the responses that supported this include:

"I had very great teachers. Teaching and research was the profession I wanted to choose because I had very good teachers at the Pre-University and at University levels, so I wanted to be like them."

"Having (a) role model is one important factor."

"I want to be a role model for my research students and I think they should be too to their students"

The influence of God in the life of the people, and how God would reward ethical behaviour through divine merits were stated to be influencing the RP of academics. These concepts were stated at least four times.

"In India, the teacher (Guru) is held higher than God, and coming from that tradition, I believe that the academic has a lot of responsibility towards good teaching and research."

"If I do proper research, if I do proper teaching, to the best of the abilities that God has given me, I believe that I will gain more 'punniyam' (Divine merit) or will have a better reincarnation as a result of having performed my duties well…"

"…like a few of my colleagues, I consider that conducting research and teaching students is a duty given to me by God. But such thoughts of moral duties are slowly going away these days".

There were also comments on other beliefs such as 'Vaastu' (Architectural codes that are supposed to bring good luck. Similar to Feng Shui) and considerations of auspicious time to do a particular job.

"Vaastu is something everyone does, for example, when any college is being built, it will be built based on it, most of the houses, apartments etc., it is to give good fortune to the institution. Whether it increases the ranking or research is different (difficult to say)"

"For thousands of years, Indians have made sure that 99% of all the important ceremonies, marriages, engagements are done during auspicious times. I know a lot of academics send their paper(s) to the journals on auspicious times. Especially handing in of the PhD thesis, starting it etc. are mostly done at auspicious times"

"These are sometimes considered as taboos and on the outside people may say that they do not believe in it, but most of them do"

Interestingly, one of the respondents stated that getting a better husband or wife is a reason to do a PhD.

"In India, arranged marriages are the norm. Women prefer not to do a PhD before marriage as the husband likes to have a higher degree than the wife. The man however starts a PhD so that he gets a better arranged marriage"

This research, being one of the first to explore how indigenous factors influence the RP of academics, contributes to the literature and fills a gap in that literature.

Overall, it should be stated that there has not been any studies exploring the effect of the policy changes, the changing academic environment and the indigenous factors on the RP of academics in India and to identify if these have really helped in improving both the quantity and quality of the research.

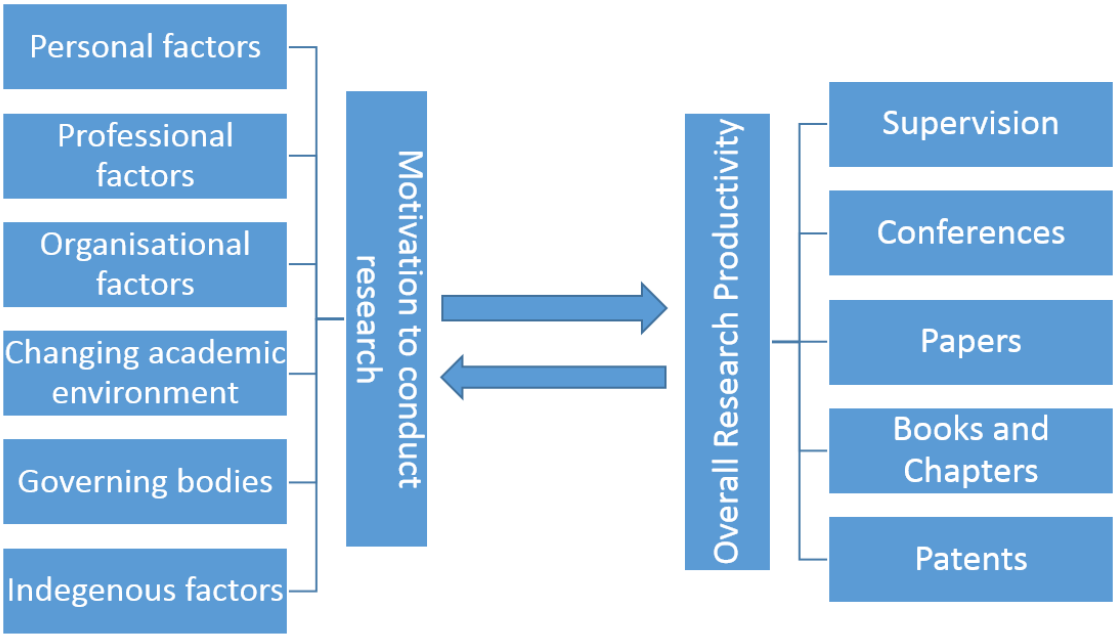
There are a small number of studies which has looked at the influence of the above on job stress, job satisfaction, burnout etc. For example, Kumari (2013), Aggarwal and Medury (2012), Dabre (2012), Karthik and Velavan (2012), Katoch (2012), Sharma and Manani (2012), Bhatia (2012a) and Deshwal (2011), but no studies have explored their influence on the RP of the academics. Based on the literature and the pilot

interviews, a set of questions exploring the influence of indigenous factors were formed to evaluate their influence on academics' RP.

2.2.1.4 Conceptual model:

Based on the literature, several factors such as personal, professional, organisational, changing academic environment, governing bodies and indigenous factors seem to influence the RP of the academics. Research Productivity is measured as a sum of different elements of research productivity such as supervision, conferences attended, papers, books and chapters published and patents applied for. The conceptual model that can be formed is given in Fig.15.

Fig.15: Conceptual model of the factors influencing the RP of academics:



Source: Author

2.2.1.5 Conclusion:

How academic staff perceive their workplace and institution is of great importance for formulating HR strategies in the higher educational sector (Capelleras, 2005). Overall,

it can be seen that RP and its determinants are a complex set of elements that individually and together act to either increase or decrease the RP of academics.

This chapter has looked at the various factors influencing the RP of academics. Contemporary research studying RP have been very quantitative (Subramanian and Nammalvar, 2017, Krishnan and Raja, 2015, Ranganathan and Balasubramani, 2013, Jasmine et al., 2011, Repanovici, 2011), viewing RP either based on scientometry or measuring how individual and institutional traits influence RP. None of the studies based in India has looked at RP from a qualitative approach, exploring how the different factors, the culture and factors specific to the rapidly developing environment has influenced the RP of the academics. With Forest and Altbach (2006) critiquing that the institutions in developing countries, rather than developing their own practices, just look elsewhere to obtain new knowledge and analysis.

The Indian scenario is unique with its rapidly developing HE sector, issues such as corruption spilling over into academia (Tierney and Sabharwal, 2017). India being culturally very different from Western countries, it is therefore important to formulate policies and practices that are more indigenised and are suited to an Indian environment and use them to increase both the quantity and quality of research conducted in its HEIs.

This section of the chapter looked at the various different factors that influences the RP of the academics, the next section explores the literature written between 1990 till 2017 on Indian academics exploring the RP, motivation to conduct research etc. It intends to help identify any gaps in literature.

2.2.2 A review of the literature on the Indian academics' research motivation and research productivity:

This section reviews the state of research into the factors motivating academics in Higher Educational Institutions (HEIs) in India. A comprehensive analysis of the literature using a computerised search for papers published in English from 1990 till 2013 was carried out. (The researcher understands that the thesis is being handed in by 2018, whereas this review is only until 2013. But the gap in the literature was identified in 2013 for this study. A review on the papers from 2014-2017 is also discussed in the section 2.3.2.4). Thirty-two papers were identified and analysed based on various characteristics such as their epistemology, the choice of motivational theory/framework used, year of publication, geographical origin, focus and area of study etc. Additionally, the quality of journals in which the papers have been published are also analysed. This review will lead to the gap in the literature and the need for research.

2.2.2.1 Rationale for the review:

In this section, the literature on the research motivation and Research Productivity (RP) of the Indian academics are identified and studied. The rationale to study the literature is to understand the following:

1. What is the current state of literature studying Research Motivation (RM) and RP of Indian academics?
2. What are the characteristics of the research that has been conducted in this area?
3. What are the variables identified by the literature to be important for RM and RP of the academics?

4. How relevant are the identified studies to the rapidly evolving Indian HE scenario?

To answer the above questions, this review uses the available literature from a system's perspective and conducts a scientometric analysis of the various papers published on the motivation of the academics from 1990 till 2013 and identifies trends and the gaps in literature and the wider issues in the area.

2.2.2.2 Methodology for the meta-analysis:

A series of computerised searches for articles published from 1990 to 2013 on academics' work and research motivation in India were made. The various databases that were used for searching literature include: EBSCO databases, ISI Thomson, Scopus, IEEE, Science Direct, PsychInfo and metaLib. Search in these databases resulted in only three research papers, so Google Scholar was also used to find papers. A combination of keywords including 'motivation, academics, India, research productivity, Indian Higher Education, research motivation, publications, job satisfaction, goal setting, colleges, lecturers' etc. were used to identify the papers.

The ultimate target was to find papers that specifically studied research motivation and RP of the of the Indian HE academics. Only papers that were written between 1990 till 2013 were selected. Research on topics that studied student motivation, attitudes, primary and secondary school teachers' motivation were omitted. Only papers with empirical research were considered. Papers that offered general opinions without clear evidence of data, literature reviews and scientometric papers were omitted. Similarly, books and research that studied work motivation as just one of the variables among many were also neglected.

A three-step screening process was adopted for selecting the papers. Initially, a computerised search for papers related to work motivation was conducted to find the papers. Next, the abstracts of the results based on the keywords were all printed out and read for their significance and relevance. These abstracts were short-listed based on the previously mentioned selection criterion.

The resulting abstracts were collected, and the full papers were printed out and read. Finally, the literature these papers had cited were carefully searched for any relevant papers which were again selected based on the above criteria. This was carried out until no new relevant papers were found.

Overall, 925 abstracts were identified and out of them only 57 were selected. The full papers associated with these abstracts were printed and read thoroughly. Out of these, 24 papers were selected. The literature cited in these papers was used to identify 12 further papers. Four of the papers could not be accessed as they were available only as citation and not online.

The researcher e-mailed the authors of two of the unavailable papers (The other two did not have the authors' contact details), but there was no response. Further scrutiny using the selection criteria, resulted in a total of 33 papers which were used for further analysis.

2.2.2.3 Results of the meta-analysis:

The papers were observed for various characteristics such as the year of publication, the geographical location of research, epistemology and the research design adopted, domain of work motivation and the types of institution in which the research has been

conducted. Finally, the papers were reviewed based on the quality of the publications and journals in which they have been published.

2.2.2.3.1 Year of publication:

Table 6 classifies the papers according to the year of publication. This showed a gradual increase of interest in the subject and the number of papers in this area until 2010. Over the twenty-three-year period from 1990, relatively few papers have been written on these topics. This goes in hand with the global dearth of research in the field of motivation as noted by Devadass (2011). 90.63% of the reviewed papers have been written from 2006 onwards, with 65% of research being conducted from 2011 onwards. This might be due to the rapid increase in the number of HEIs and the gap in the literature which the academics might have identified.

Table 6: Classification of the papers based on the year of publication:

Years	No. of papers published	% of papers published	Papers
1990 – 2000	0	0	
2001 – 2005	3	9.37	(Pattnaik, 2003, Pattnaik and Chaudhury, 2001, Jha et al., 2004)
2006 – 2010	8	25	(Sinha and Sinha, 2008b, Rama Devi, 2006, Abbas et al., 2010, Gautam et al., 2006, Kumar, 2006, Madaan, 2008, Kanith and Kaur, 2010, Sharma and Jyoti, 2009)
2011 - 2013	22	65.63	(Goswami and Dwivedi, 2011, Karthik and Velavan, 2012, Aggarwal and Medury, 2012, Das and Gujrati, 2013, Kayalvizhi, 2011, Bhatnagar et al., 2011, Dabre, 2012, Malati, 2013, Katoch, 2012, Deshwal, 2011, Ruby and Biswas, 2012, Kumari, 2013, Suryanarayana, 2012, Sharma and Manani, 2012, Qureshi et al., 2013, Khurana et al., 2013, Deepanjana, 2011, Shigli et al., 2012, Gupta et al., 2011, Raju, 2013, Bhatia, 2012b, Miller Jr, 1997, Manjunath et al., 2011)
Total	33	100	

Source: Author

Table 6 also suggests that there has been no research published exploring work motivation and job satisfaction of Indian academics between 1990 till 2000. One of the reasons for not being able to access the papers before 2000 might be the lack of online journals, papers being published online and the lack of open access journals before 2000. The hard copies if any were not accessible. Since this paper takes into consideration only those available online, it could miss out on the papers that were printed on hard copy and have not been converted/published online.

2.2.2.3.2 Authorship patterns:

Looking at the authorship patterns, Table 6.1, reveals that 69.69% of the papers were either written by a single or two authors, followed by three and four authors. This is in contrast with Baskaran (2013) whose review of the papers written at a South Indian University from 1999 till 2011 found that 93.94% of the papers were multi-authored and only the remaining 6.06% of the papers were single authored.

Another work by Sahoo et al. (2017) on Indian premier institutions shows that there is a growing trend of multi-authorship which is supported by Arif (2015) who show that 98% of the papers were co-authored or multi-authored in India. Whereas this paper shows a moderate popularity of single authored papers. Out of the 21 papers written in collaboration with other authors, all of them were written with local authors and none with international co-authors

Table 6.1: Classification of the papers according to the no. of authors:

No. of authors	No. of papers	% of papers
1	12	36.36
2	11	33.33
3	8	24.24
4 or more	2	6.06
Total	33	100

Source: Author

2.2.2.3.3 Geographic distribution of the papers:

India being the seventh largest country by area in the world, there is a risk of generalising the results of the research being conducted in one part of the country to the others due to the significant differences in the socio-economic and cultural elements of the people. So, conducting regional research would be more appropriate. Table 7 shows the distribution of the papers according to the geographic location in which they have been conducted. It should be noted that even though a paper might be authored by a South Indian academic, if the research was conducted in North India, the paper was considered to be from the North.

Table 7: Geographic plot of the papers and the no. of HEIs

Parts of the country	**Number of papers published**	**% of papers published**	**No. of colleges / Affiliated institutions**	**No. of Universities**	**Total no. of HEIs** (UGC, 2012)	**Paper to institution ratio**
North	16.25	49.24	8,881	145	9026	1: 555
South	6.25	18.9	10,619	170	10,789	1:1726
West	1.25	3.78	8,933	130	9063	1:7250
East	0.25	0.76	4,590	189	4779	1:19116
Not specified	9	27.27				
Total	33	100	33,023	634	33657	1:1000.7
One of the papers had collected data from all the regions so 0.25 score was given to each region. The data for the number of Universities and colleges are based on the data from (UGC, 2012).						

Source: Author

Out of the 33 papers, there was one paper which had collected data from all the four parts of the country, so 0.25 score was given to each part. Nine of the papers had not stated where the research was conducted.

Apart from the paper with data from all parts of the country, Table 7 shows that 16 papers have been written based on the research conducted in North, with only 6 papers exploring the South, only 1 in the West and none in the East of India. The Table also compares the number of papers with the number of HEIs in each part of the country.

On one hand, 16 papers in the North looks like a considerable amount of research, whereas contrasting them with the number of institutions and looking at the paper to institution ratio, reveals a low quantity of papers for all the number of HEIs. In the South, the disparity between the number of HEIs and the papers are even more revealing, with only 6 papers having explored academic work motivation and job satisfaction, whereas the region has 10,789 HEIs and the paper to institution ratio being 1: 1726. This shows a very low ratio of the number of papers to the number of HEIs, thus revealing very limited research in this field. The number of papers and the paper to institution is lower in the West of the country with the East of India showing the lowest ratio.

An interesting research would be to study the work motivation and RP of academics across the geography of the country, their similarities and differences etc., and to explore the reasons for this.

The overall paper to institution ratio also shows very limited in terms of research exploring this area, this raises a serious question about how the institutions form their human resource and research policies and if these policies are informed by empirical research or if they are formed just based on previous experiences and/or rule of thumb!

2.2.2.3.4 Focus of study of the papers:

Table 7.1 reveals that studies focussing on job satisfaction of the academics are the most popular, followed by studies on the factors that promote and impede work motivation and research productivity. It is surprising that few papers have studied retention of academics particularly as with so many HEIs, it is easy for the academics to hop institutions.

Also surprising is the absence of studies in terms of absenteeism and burn-outs in academics especially in the Indian environment where working on Saturdays is almost a norm. This reveals some important gaps in literature.

Table 7.1: Classification of papers according to the focus of study

Subject area focus	No. of papers	% of papers
Job satisfaction	17	51.51
Factors of motivation and research productivity	7	21.21
Absenteesm/ burnout	0	0.00
Employee retention	2	6.06
Total	33	100

Source: Author

Of those papers that look at the factors of motivation and productivity, all used 'Needs' based theories: with Herzberg's Two Factor Theory enjoying the most popularity followed by Maslow's Hierarchy of Needs. Perhaps it is due to their more established nature and simplicity that Herzberg's and Maslow's theories are used in every case. None of the papers use 'The new friends' as (Ambrose and Kulik, 1999) call them or the theories based on cognition, self-determination and goal setting theories.

Table 8 shows that almost 50% of the papers have collected data across various disciplines, however on closer inspection none of these papers attempt to explore the similarities and differences in the work motivation between academics from various disciplines. it shows a shortage of papers written on academic work motivation and research productivity in India comparing disciplines.

Table 8: Classification of the papers according to the type of institutions

No. of authors	**No. of papers**	**% of papers**
Arts and Sceince	2	6.06
Engineering	6	18.18
Business studies	1	3.03
Medical+ Dental and Vertinary sciences	4	12.12
Law	0	0
Agriculture	2	6.06
Others/ Mixed	16	48.5
Education	0	0
Not Stated	2	6.06
Total	33	100

Source: Author

Only 6 studies look particularly at engineering institutions, of them none study the RP of the academics. This is a gap in the literature that needs addressing. Another gap in the literature is that currently there is no evidence of research into the similarity or the differences of the work motivation in faculties across the spectrum of disciplines.

2.2.2.3.5 Epistemology and methodology:

Table 9: Classification of papers according to their epistemology

	Direct observation of objective reality	**People's perception of objective reality**	**Artificial reconstruction of objective reality**
Axiomatic			0
Logical/Positivist/Empiricist	0	32.5	0
Interpretive	0	0.5	
Critical theory		0	
When more than one epistemology was used, the scores were split.			

Source: Author

Table 9 shows that only one of the papers had used mixed method, so 0.5 score was given to its respective epistemologies. It is evident that all the papers but one have heavily relied on positivist epistemology.

An interesting observation from Table 9 stems from the choice and the nature of epistemology used by the papers. Positivist epistemology is usually used for testing, ranking or quantitatively verifying an existing theory, or factors that are already known and distilled from the literature, whereas interpretive epistemology is used for understanding the reasons behind certain phenomenon or to create a new theory based on the social interpretations of the people (Cooper et al., 2012, Easterby-Smith et al., 2012, Blaikie, 2007, Gummesson, 1993). All the 32 papers have only tested, ranked or measured factors based on Herzberg's and Maslow's theories. They have not attempted to qualitatively develop new theories or models or to understand the reasons behind a complex phenomenon such as work and research motivation or RP, particular to the Indian HES.

Table 10: Classification of papers according to the methodology

Method adopted for data collection		
Quantitative	**Mixed**	**Qualitiative**
32	1	0

Source: Author

Along with the lack of studies using an interpretive approach, there are no introspection or longitudinal studies on the topic which would have given an extended picture of the evolution of the needs, job satisfaction and work motivation of the academics.

Nearly all of the papers have used a quantitative approach with only one paper adopting a mixed method approach (Table 10). This has resulted in a gamut of theory testing rather than theory generation and developing new insights. Though a

quantitative approach has its advantages, it has not helped in identifying factors outside the questionnaire that might influence the motivation of the academics especially the factors that are indigenous to the Indian culture and the rapidly developing Indian academic environment (Bakthavatchaalam et al., 2017a, Bakthavatchaalam et al., 2013).

This is a major gap in literature as the factors that influence the job satisfaction, work motivation and the research productivity of the academics might be different to the already known factors or the factors based on international literature that are being tested in these studies. These indigenous factors should be explored and their influence on the RP, research motivation of the academics should be quantified. This review recommends more research should be conducted using mixed and qualitative methods.

2.2.2.3.6 Citations of the studies:

The citations of the selected papers were explored. The literature the papers had cited were split according to those based on non-Indian or foreign literature, studies based on Indian manufacturing, service and schooling system, studies based on Indian academia and others. It was observed that 78% of the total 536 citations were based on foreign (Non-Indian) studies. Of the citations based on India, 8.4% were on Indian manufacturing, service or school system; 11% of the references were based on Indian HEIs and 3% of them were classified as others.

There are two features that stand out when looking at these statistics. First is the huge dependence on foreign literature in studying work motivation of Indian academics. Secondly, 8.4% of the citations reference studies conducted in an industrial setting, service or school system. Schulz (Schultz and Schultz, 2006) comment that the

research findings on job satisfaction based on other professions may not be of much use in HE settings.

The heavy dependence on foreign literature might be due to absence of the quantity and quality Indian literature on this topic. Even though referring to foreign literature can be useful when trying to understand the factors influencing the research motivation and research productivity in other countries, studying a complex psychological and social phenomenon such as work motivation might be better if the literature used had more local context.

For instance, Khatri et al. (2012) points out the issues associated with the blind acceptance of Western management models, mostly developed in the US and trying to apply them in an Indian milieu. They question if the ontological and the epistemological assumptions these theories hold are applicable to India or not. Further to this, Khatri et al. (2012) comment on the importance of considering the cultural differences between the countries where the theories are developed and where they are implemented. Also, Ruby et.al. (2012) comment that very little research has been conducted on the motivational practices across cultural dimensions. The absence of research based on the RP of the Indian academics is one of the reasons why section 2.2.1 also uses considerable number of citations based on non-Indian HE settings.

2.2.2.3.7 Type of journals published:

Table 11 shows that only 24.24% of the papers were published in free and Scopus, ISI Thomson indexed journals and 69.69% of the papers have been published either in paid or non-indexed journals. Reading through the papers, it was evident that most of the papers in the 69.69% were poorly written.

Table 11: Classification of papers according to the type of journal:

Type of journal	No. of papers	% of papers
Paid and not indexed in Scopus, ISI Thomson	23	69.69
Free and indexed in Scopus, ISI Thomson	8	24.24
Not specified / Not sure	2	6.06
Total	33	100

Source: Author

Raju (2013) and Shen and Björk (2015) state that India is among the top contributors of research published in poor quality, 'predatory' and open access journals, with Gopalakrishnan Saroja et al. (2016) reporting that these journals are usually non-peer reviewed, demand payment for publishing and are not indexed. To classify the type of journal in which these thirty-three papers have been published, 'paid and unindexed (Not indexed in Scopus or ISI-Thomson) journals' were considered "low quality" and their counterparts as "high-quality" publications. Though such classification might lack rigour, it was chosen for simplicity. This review shows that the percentage of good quality papers is lower than the 51% predicted by Gopalakrishnan Saroja et al. (2016), but the sample in this research is relatively small.

Results from Table 11 raises serious questions about the quality of the research that is being conducted and the results, recommendations offered by many of these papers. This requires further exploration. Some of the reasons for the use of low quality publications are the ease of acceptance, the short time needed to be published in them, the lack of awareness of predatory journals, poor writing skills, publishing pressures on the academics and the rise of profit motivated commercial publishers who are less concerned about the scholarship and the quality of the papers – as

reported by Gopalakrishnan et al. (2016), Raghavan et al. (2015), Shen and Björk (2015), Singh (2014) and Beall (2012).

2.2.2.4 Updating the literature from 2014-2017:

For the literature from 2014 till 2017, only those papers published in high quality, free and indexed in Scopus, ISI Thomson papers were selected. This was done so as to eliminate the low quality publications. Also, only papers that looked at RP of the academics and its determinants were selected. This was because at the time of updating the literature the researcher was aware that the thesis will focus solely on RP.

Overall, in the four year period, a few scientometric papers were written on RP (Hariohm et al., 2016, Krishnan and Raja, 2015). There were also some excellent opinion pieces and commentaries on RP both directly and indirectly in this period by Altbach (2015a), Altbach (2015b), Altbach (2015d) and Panda and Gupta (2014).

The researcher identified Sahoo et al. (2017) and Paul et al. (2015) as the only papers fitting the selection criteria. Paul et al. (2015) comment that even in the high performing institutions, only 28% of academics were in the high RP region. They point out that a proper career advancement scheme would help increase the RP and suggest a balanced involvement in both teaching and research to be important. Sahoo et al. (2017) studying the institutions of national importance, point out that the RP of the academics with foreign degrees was higher than those with local degrees and that both private and public institutions had a similar RP. They call for improving the quality of the doctoral studies in general as a way of increasing the RP.

Looking at these studies: They are both multi-authored papers, and are both conducted across Indian regions. They study RP using a quantitative approach. While studies agricultural scientists, Sahoo et al. (2017) looks at management academics.

Relatively few works such as Tierney and Sabharwal (2017), Mohamedbhai (2016), Sukhtankar and Vaishnav (2015) and Altbach (2015c) talk about the academic corruption, academic dishonesty and corruption in general, which is an integral part of this thesis.

Overall, it is clear that the updated literature review does little to alter the perception of a shortage of research on the academics' RP and their research motivation, the various factors that influence RP etc. with Paul et al. (2015) commenting that studying the RP of academics empirically is a new area in India.

2.2.2.5 Conclusion and the need for research:

This review has looked at the various characteristics of the selected papers and it can be seen from Table 6 that only after 2010 has there been a real growth of interest in this field. It is surprising that so little research has been conducted in the rapidly developing country of India and its expanding higher educational sector. The review has identified a range of gaps in literature. They include:

1. Both the quantity and the quality of the research looking at the RP of Indian academics carried out is low.
2. No 'Theory building' qualitative studies have been carried out. This is essential to use qualitative and mixed method approaches as they could reveal factors that are not available in the current literature.

3. Even the quantitative studies that have been conducted do not take into account the rapidly changing academic environment and its influence on the RP of the academics.
4. None of the papers have studied the influence of indigenous factors or the Indigenous factors / Elements of Cultural Identities (EoCIs) and/or corruption etc. which are important to study.

These are the gaps in the literature which this section has identified. Thus emphasising the need for further research to be conducted to fill the gaps. To do so, this thesis will focus on the RP of the academics in the engineering institutions of South India. Since South India is very huge, the research will focus on the engineering institutions in the city 'Coimbatore'. The rationale for choosing Coimbatore is explained in the methodology chapter.

"This research will use mixed method, to both quantify the various factors influencing the RP of the academics, and also to understand the 'why' and 'how' these factors influence the RP. This on its own would help fill the gap in the literature. Whereas this thesis will go a step further by exploring how the various EoCIs, factors associated with corruption etc., influence the RP and combine them with the traditionally studied 'personal', 'professional', 'organisational' factors."

The next chapter looks at the best possible ways to fill the gap in the literature. It looks at the various methodologies and the tools that can be used to answer the research questions.

Chapter 3 Methodology

3.1 Introduction:

This chapter offers an overview of the various methodologies for data collection and analysis tools. It describes the various philosophies, ontologies etc. of the research. It identifies and justifies the research philosophy and methodology used in this research. This chapter also describes how the research is conducted and the analysis tools used. This chapter summarises the research philosophy, ontology etc. used in this research, with more detail of them given in Appendix 8.

3.2 Research Philosophy:

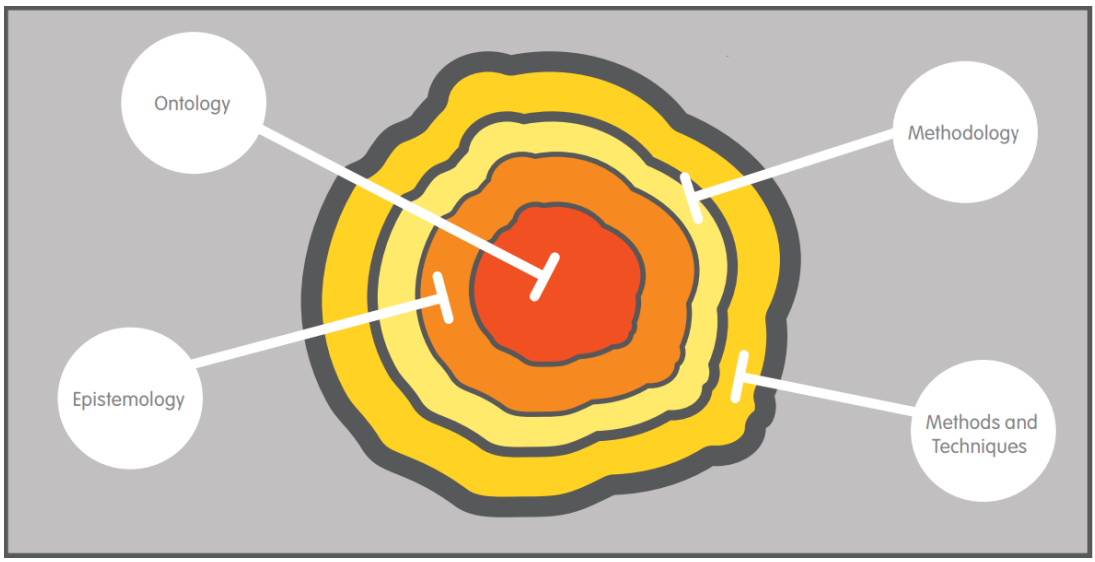
Research philosophy is a complex topic that deals with the source of knowledge, it's nature and how it is developed (Bajpai, 2011). In any research, it is important to have a clear understanding of the research philosophy and its influence on the successful outcomes of research It is important that the researcher discloses and is clear about the research's philosophical stance, especially in social research as humanistic elements introduce a variety of convolutions unlike studies on natural science (Blaikie, 2007). Section A8.2 in appendix 8 talks in more detail on research philosophy.

"This research is social rather than a scientific. The research considers that facts are subjective and vary according to people and that facts are constructed by people and not something that is external to the observation."

The following sections of this chapter details the philosophy adopted in this research by discussing its ontology, epistemology and the methodology adopted.

The position of ontology, epistemology, methodology and methods/techniques in a research is given by Easterby-Smith et al. (2012) in Fig.16 with ontology at its core.

Fig.16: Ontology, epistemology, methodology and methods.



Source: Easterby-Smith et al. (2012)

3.3 Ontology:

Ontology is the set of assumptions about the nature of reality. It is how reality is being viewed by the researcher and is about the existence of reality on the whole (Gummesson, 1993). In simple words, it is the question: 'If the nature of reality is seen to be objective that is external to the observer or if reality is a social phenomenon that is constructed/ interpreted in the mind of people' (Blaikie, 2007). See section A8.3 for details on the various.

"This research takes a combination of realistic and relativist positions for its ontology. It takes a position that the truth is obtained by consolidating various viewpoints (Relativism) and by verifying the predictions and the facts using statistical methods (Realism). In essence, this research considers that truth can be known by integrating both objective and subjective observations."

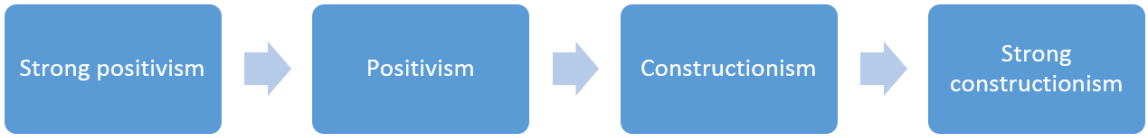
3.4 Epistemology:

Epistemology and ontology goes hand in hand, with both of them depending and informing each other (Easterby-Smith et al., 2012, Nation, 1997). Hatch (2006) defines epistemology as the knowledge of knowing how one knows or can know. It can also

be explained as the set of assertions or assumptions on the ways in which knowledge of reality can be gained or accessed (Killiam, 2013).

Easterby-Smith et al. (2012) classifies epistemology into: positivism and constructionism / interpretivism also called as the 'Social Constructionism' along a spectrum, as seen in Fig.17.

Fig.17: Spectrum of the Epistemologies:



Source: Author, based on Easterby-Smith et al. (2012)

This research takes a combination of positivist and constructionist view, and so these two types will be described in the following section. Table 12 (see appendix 8) gives an overview of the different epistemologies.

"In this research, a constructionist view is used and for qualitative and a positivist view for the quantitative data. This research uses a mixed approach, positivist and constructionist. This research measures and quantifies the Research Productivity (RP) of the academics and the factors influencing them using a deductive approach. The research also attempts to understand 'How' and 'Why' indigenous factors, EoCI, AD, CAE etc. influence the RP of the academics using an interpretivist approach"

3.5 Methodology:

Methodology is the strategy or a plan linking the methods chosen to the desired outcomes (Easterby-Smith et al., 2012). So, it is an overarching approach in which the data is collected using specific method/s. The following section talks about the common methods used for collecting data and the analysis tools used for conducting this research. Section A8.5 details the various methodologies and on aligning them with the research requirements.

3.5.3 Selection of methods:

Hall (1996) comments that the selection of methods should depend on a knowledge of which approach will best way offer an explanation and understanding of the social situation under study. By choosing particular methods for the research the researcher also brings along the assumptions about the nature of reality of the world and how to measure that reality.

Qualitative methods use an inductive approach to create new theories from the observations whereas quantitative methods use a deductive approach which starts from theory and is tested by observations (Easterby-Smith et al., 2012). The major criticism of an inductive approach is that the process is very subjective and dependent on how the observations are interpreted. It also requires the researcher to acknowledge and reflect on their (researcher's) role in the research and how they might have affected the process of research and vice versa (Golafshani, 2003, Seale, 1999, Miles and Huberman, 1994, Halcomb and Hickman, 2015).

"The researcher even though from Coimbatore, has been in the UK for a decade, so the pre-understanding of the researcher about the academic system from the management's and the staff's point of view are little/ very limited. The pre-understanding on the research topic were largely based on the literature review. So, for the researcher, it was like discovering the Indian academia again. So, the pre-understanding of the researcher has had little influence on the way the process of the research. Whereas the researcher has a good pre-understanding of the Indian culture, getting through gate keepers, access to the faculty, protocols, and how to approach the institutions. So, the pre-understanding of the Indian culture actually helped the researcher in conducting the research."

There are many criticisms of an deductive approach in a social research, with Glaser and Strauss (1967) commenting that when more emphasis is given to theory verification, it stifles investigations progressing into new areas of research and in

generating new theories. Punch (2005) adds that if a specific research area lacks appropriate theories, then a theory building approach by using inductive approach should be employed.

"In this research, it can be seen from the literature that there have been no theory building studies and very few theory testing studies have been conducted in the Indian HE system looking at the RP of the academics, so using both an inductive and deductive approach seems appropriate."

3.6 Tools for collecting data:

This section looks at the techniques that are popularly used to collect data.

"Both questionnaires and interviews were used to collect data for this research."

3.6.1 Questionnaires:

One of the most popular methods of collecting quantitative data is by using questionnaires, where the same questions are presented to the target population in the same, standardised way. This is to maximise validity. The researcher stays away from the respondents to make sure that the results from the respondents are not influenced by the researcher in any way. This is an easy way of collecting a lot of data and to reach more respondents than by using qualitative methods (Easterby-Smith et al., 2012).

If the response rate for the questionnaire is low, then there arises a question if the people who answered the questions are in anyway different from those who did not? Would this affect the validity? (Easterby-Smith et al., 2012)

Qualitative researchers criticise the usage of a quantitative approach to study complex phenomenon such as social realities, cultural elements and social phenomenon

(Lodico et al., 2010). They argue that using quantitative methods would reduce / simplify the richness of the data and that social phenomenon cannot be understood with objective facts and numbers. They recommend using a more in depth approach such as a qualitative approach (Lattore, 2009). In a qualitative approach, 'data' is not something out there that needs collecting, but data is created through social processes (Barbour, 2014). The qualitative researchers further comment that the social world cannot be studied from an outside perspective (like using a questionnaires) but requires an approach which can capture how the actors continuously construct and re-construct their world. In such cases, qualitative methods such as interviews could be used to capture the richness of the data (De Vaus, 2014).

3.6.2 Interviews:

Interviewing is a common technique for qualitative data collection. Interviews that are designed to gather rich in-depth data offer a full description of the informant's views (Easterby-Smith et al., 2012).

Interview methods can be placed on a scale in terms of their structure. They are structured, semi-structured, group interviews and unstructured.

3.6.2.1 Types of interviews:

A completely structured interview will offer quantitative data that can be analysed statistically, whereas a semi-structured interview offers the advantage of both quantitative and qualitative data. An unstructured interview is completely qualitative and is used for understanding the reasons behind a certain phenomenon (Lattore, 2009). In a semi-structured interview, the interviewer has an idea on the area that

needs to be explored and has a set of questions that s/he uses to collect data from the respondent/interviewee.

Group interviews are conducted with the interviewer acting as moderator interviewing a group of interviewees. Group interviews offer the opportunity for discussions amongst the interviewees and with the interviewer which is not possible in other methods. One of the issues with group interviews as expressed by Hall (1996) is that there is a lot of potential for the interviewees to accept the dominant view in the group.

An unstructured interview is completely open ended and where the interviewees have more opportunity to expand on their views and if needed, the researcher also joins in with his/her views. Here, both the interviewer and the interviewee construct meanings out of the data and the interviewer takes an active part in the process of data generation (Lattore, 2009, Glaser and Strauss, 1967).

3.6.2.2 Considerations in interviewing:

Since semi-structured interviews are more open-ended compared to questionnaires, the interviewee can express their thoughts on the question more freely compared to structured forms such as questionnaires (Johnson and Christensen, 2013). In interviews in general, the results are allowed to emerge from the data and its' interpretations (Sherif, 2010).

"For the qualitative data collection, this research used a semi-structured approach. This was done as the researcher was already aware of the area and the questions that needs exploring. If the researcher were to start from scratch, then an unstructured interview might have been appropriate. Interview questions used are given in Appendix.7. In this research, the researcher has also written a reflective section (Introspection) on how the research and the collected data has influenced his thought process and vice versa."

3.6.2.2.1 Rapport and place of interview:

In face to face interviewing, the researcher is an active part of the data collection and is no more a passive recipient. One disadvantage is that interviewing might be affected by the rapport between the interviewer and the interviewee and the rapport might also depend on the perceived characteristics of the interviewer such as age, sex, ethnic group, social class etc (Barbour, 2014). Hall (1996) suggests that for in depth interviewing, the researcher needs to be as 'natur.0al' as possible and creating a good rapport with the interviewees enables and encourages them to express their views without any constraints.

It is important that the research and its purpose is fully explained during an introduction session, especially if the interview is with people who may feel vulnerable. Along with the introduction, it is essential to give the interviewee a brief overview of the types of questions that might be asked.

"In this research, the researcher gave a brief introduction to the study and gave them the list of questions to look at. They were asked if they felt comfortable with the interview and the questions before proceeding with the interview. All of the respondents were OK and approved the questions and for the interview to proceed"

"In terms of this research, the researcher can report that there were no instances of uncomforting moments between the interviewee and the researcher. The interviewees were more open in expressing their views than anticipated and there were no instances of the interviewees treating the researcher as an outsider and concealing their thoughts. The interviews were more of a friendly conversations rather to it being a very formal interview. This created a friendly rapport with the interviewees."

The place of the interview is another important consideration as it affects the quality and truthfulness of the data offered and collected (Barbour, 2014, Johnson and Christensen, 2013, Lodico et al., 2010). Johnson and Christensen (2013) suggest a neutral or an informal venue for the interview so that the interviewees are more at ease.

"In this research, the choice of the location was left for the interviewee to decide. They were asked to choose a venue that they felt was comfortable for them"

3.7 Reliability:

Reliability is the measure of how consistent the measuring instrument is (LoBiondo-Wood and Haber, 2014). Reliability tends to decrease the error value in the measurement and increases the 'true value' of the measurement (Hall, 1996). If the reliability and the validity of the research conducted is low, it cannot be considered that a significant addition to knowledge has been made by that research (LoBiondo-Wood and Haber, 2014).

In terms of reliability, the two major elements of consistency are the instrument's consistency over time and internal consistency. Consistency over time is: Will the scores of the instrument be the same if it is used at different times on the same people. Internal consistency is the measure of knowing if all the elements in the measuring instrument measure the same latent trait? (Hinton et al., 2014, Field, 2009, Kerr et al., 2002). A common method used to measure the internal consistency is to calculate the Cronbach alpha (Field, 2009). The generally accepted scale states that if the alpha value is more than 0.9, then the instrument has excellent consistency, a value between 0.6 and 0.9 is acceptable and a value below 0.6 is low consistency (Gordon, 2012, Field, 2009, Ulrich and Frauke, 2005).

Consistency over time of a respondent is a debated topic and that it is expected that the respondents' ideas, thoughts and perceptions change with time. Especially in qualitative research it is difficult to have consistency over time, especially because concepts such as validity and reliability are rooted in positivist approach (Golafshani, 2003).

3.8 Validity:

Along with reliability, validity allows the researcher to assess the quality of the tools and to know what characteristics it should include (LoBiondo-Wood and Haber, 2014, Merriam, 1998). Validity relates to knowing if the research did actually study what it says it studies (Seale, 1999). Punch (2005) comments that validity is how the different parts of the research fits together.

The term 'Validity' has a few meanings and should be used carefully. Internal validity for instance is to know if the research has studied the true reflection of reality and external validity looks at how generalizable the results are to other settings (Hall, 1996). Quantitative experiments possess high internal validity but when they are generalised they have low external validity. On the other hand, qualitative interviews might have low internal validity, but have high external validity (Hall, 1996). Overall, validity is how the quality of the research is judged.

"In this research the reliability and validity of the tool were tested in several ways.

First, the face validity of the tools (Both quantitative and qualitative) was tested by a group of academics in Coimbatore. The academics include both engineering and management staff. The engineering staff look at any context oriented issues with the tool and the management staff look at the designing, structuring, layout, any possible issues with future analysis etc.

The construct validity was tested by factor analysis and structural equation modelling as suggested by (Westen and Rosenthal, 2003). Noting that it cannot be tested by a single study and requiring several studies to iterate and refine the tool.

To increase the validity and reliability of the study, pilot studies were conducted, both qualitative and quantitative (Polit and Beck, 2012). This was to identify any unrelated items in the tools that should be removed and hence increase the focus of the research, increasing it's validity. A detailed account of the changes made in the instruments based on the pilot studies are given in table 16.

The reliability of the interviews were tested by confirming the data analysis by interviewing three experts to see that no new data emerges. The internal consistency of the questionnaires, quantitative data was tested by Cronbach's alpha. The data was triangulated to increase the results' validity"

"In this research, since mixed method is used, the data was triangulated, hence increasing the validity of the study. There was no investigator or theoretical triangulation done in this study, as it would involve someone else collecting data for the researcher and, that it would be very time consuming and might result in investigator bias".

3.10 Sampling:

Sampling is done as and when the entire population cannot be considered for the research (Easterby-Smith et al., 2012) and is done to increase the representativeness of the target population. A sound sampling ensures confidence in the results mirroring reality (Hall, 1996).

The general universe is the broad category of people with whom the research is applicable. The working universe is a sub-domain of the general universe, which is the target population which the researcher is interested in or those who could be selected for surveying. The sample is an even a smaller portion of the target population who are in fact selected for collecting data The researcher is always dependent on the co-operation of others, especially during the data collection phase when he is dependent on the target population who are viewed as the experts in that field (Easterby-Smith et al., 2012, Hall, 1996).

"In this research, Indian academics are the general universe, with the South Indian academics in Engineering institutions are the working universe. The engineering academics in Coimbatore's engineering institutions that were started after 1990 were the target population".

1.10.1 Probability and non-probability sampling:

A major decision to make for any researcher in trying to sample the population is if to select the respondents based on a probability or non-probability sampling method. As Daniel (2011) and Trochim et al. (2015) comment that when each of the person/element in the population has an equal chance of getting selected for sampling

or when they all have a non-zero probability of getting selected for sampling, then it is a probability sampling. When the sampling design excludes or if it does not give equal probability to some elements/people in the population, it is a non-probability model design. The major strengths and weakness of the two methods are given in table 86.

3.10.1.1 Sampling in this research and the rationale:

This research uses a purposive sampling method in which the institutions were selected based on their age and the number of staffs working in them. Section 3.10.1 details the process of and the steps that were involved in the selection process. This is not an accidental, haphazard or convenience sampling which would have biased the data and would have severely affected the generalisability of the data (De Vaus, 2013).

The reason for adopting this sampling procedure is that if probability sampling were to be selected, then the respondents might possibly pool in one or the other category of institutional age. This might bias the data and might limit the research getting a complete overview of the respondents' thoughts across institutions of all ages. A major rationale for this choice of sampling is also because from table 5, fig. 11 and fig.12, clearly showing that the older institutions employed more number of staff compared to the newly founded institutions. If a probability model were adopted, then the number of responses from the older institutions might have comparatively been higher in proportion, again biasing the data.

Also, the data collection was done within in a span of 6 weeks as the researcher could not take more time off from his full time job to go and visit India for data collection, thus limiting the time and resources available for the research, in such cases, Trochim et al. (2015) recommends a non-probability sampling as an apt method. This research selects the institutions according to the age and the number of staff employed in them (See table 5 and table 78), thus this research aims to provide illustrative examples by selecting a range of institutions, therefore adopting a non-probability design (See table 12.1). These are the rationales for having selected a non-probability sampling design.

Each of the designs have their own strengths and weakness Trochim et al. (2015). Until and unless all of the population are selected, there always will be a bias in the results. So, any of the methods that involve 'Sampling' might influence the results of

the research and would have limitations De Vaus (2013). The current method of sampling even though provides an equal opportunity to institutions of all age and the number of staffs, has its limitations. Similarly, even in this research, since a non-probability design has been adopted, will have its limitations.

The limitations include the generalisability of the results to the entire population. Since the sample have been selected from the entire spectrum of institutional age and staff numbers, the results might be different if a probability model were selected or if the sample were only from the older or younger institutions. In order to overcome this bias, the quantitative analysis will explore, compare and contrast the ORP of institutions from different age groups. The representativeness of the sample for this research is given in sec 4.1.4.1.

3.10.2 Selected institutions and alternatives:

The engineering institutions started after 1990 in Coimbatore were the target population. The target institutions were selected on purpose (As this research focuses only on the institutions started after 1990) based on their age and size measured by number of staff members working in the institutions. One institution per age was selected and similarly, half of the selected institutions had more than 50 and the other half had less than 50 staff members working in them (See table 78 in appendix 5). The initial selection was based on table 13. But not all the initially selected institutions had data available or were accessible to the researcher, if so an alternative institution in the same age group was selected.

Based on table 13 and table 78, a total of 15 institutions were selected for data collection. In some cases, there was only one institution of that particular age, for instance, Park Institute of Technology, Krishna College of Engineering and PSG Institute of Technology and applied Research (See table 13). When one of these institutions were not available for data collection, an institution which is either one row older or younger according to table 13 was selected. Thus, the procedure adopted for

selection of institutions for data collection was thorough and logical. The summary of the procedure adopted for selecting the institutions can be found in fig. 65.

In total, data was collected from 15 institutions. Six of the originally selected institutions were not available for data collection. i.e., they did not respond to the researcher's call and the principals were not keen on the research. One of the six institution was the only one in that age group. Where institutions of a similar age and number of staffs was were available, they were selected. For that one institution, which was the only one in that age, an alternative institution which was one year older was selected. When the researcher explored the characteristics of the institutions that did not respond, the researcher expected that they might be younger institutions with a smaller number of staff members, but there was no clear pattern seen. For three of the institutions were in the 13 to 7 years old (Medium aged institutions), one was more than 13 years old and the other less than five-year-old.

Table 13: Available institutions for potential data collection and their age:

Name of the Institutions	**Age in years**
Sri Ramakrishna College of Engineering, Maharaja college of Engineering	21
Park institute of Technology	18
Krishna College of Engineering	17
Hindustan College of Engineering, Karpagam College of Engineering	15
Coimbatore Institute of Engineering and Technology	14
Ramakrishna Institute of Technology, Maharaja Pritthivi	13
Sree Sakthi Engineering College, Nehru Institute of Engineering and Technology,	9
Dr. N.G.P. Institute of Technology, Hindustan Institute of Technology, Info Institute of Engineering, Karpagam Institute of Technology, , R.V.S. College of Engineering and Technology, Ranganathan Engineering College, S.N.S. College of Engineering, Sasurie Academy of Engineering,	8
Sri Eshwar College of Engineering, Tejaa Shakthi Institute of Technology for Women, K.G.I.S.L. Institute of Technology, K.T.V.R. Knowledge Park for Engineering and Technology, Kalaignar Karunanidhi Institute of Technology, Kathir College of Engineering, P.A. College of Engineering and Technology, P.P.G. Institute of Technology, Indus College of Engineering, EASA College of Engineering and Technology, Adithya Institute of Technology	7
Park College of Technology, Akshaya College of Engineering & Technology, J.C.T. College of Engineering and Technology, C.M.S. College of Engineering and Technology, Jansons Institute of Engineering and Technology, K.P.R. Institute of Engineering and Technology, Kalaivani College of Technology, R.V.S. Faculty of Engineering, S.V.S. College of Engineering, Sriguru Institute of Technology, United Institute of Technology	6
Christ The King Engineering College, A.S.L. Pauls College of Engineering and Technology, Sri Shakthi Institute of Engineering and Technology	5
Rathinam Technical Campus, Sri Ranganathar Institute of Engineering & Technology	4

Suguna College of Engineering, Nightingale Institute of Technology, Pollachi Institute of Engineering and Technology, V.S.B. College of Engineering Technical Campus	3
Dhaanish Ahmed Institute of Technology, Arjun College of Technology, Asian College of Engineering and Technology, Vishnu Lakshmi College of Engineering and Technology	2
PSG Institute of Technology and Applied Research	1

Source: Author, based on AnnaUniv (2016), Indiatoday (2018), Indiatoday (2014), AnnaUniv (2013) and Colleges in Tamilnadu (2017).

The number of staff members in some of the institutions was not available on the institutions' websites and when the researcher called the institutions to find out, they did not reveal any detail. The mails from the researcher had no reply either. So, the alternative institutions of the same age were selected.

From the chapter section 2.2.3, it could be seen that institutions of the same age had differing characteristics in terms of the number of staff or the number of PhD employed, so care was taken that the alternative institutions selected were not too divergent (In terms of the no. of staff and the no. of PhD employed) from the initially selected institutions as in table 78 (In appendix 5). When it was not possible to do so, other institutions of the same age were selected.

Which institutions were ultimately selected in the age group have not been disclosed in this research for confidentiality. If the name of the institution were to be revealed, then it could be easy to identify a respondent. For example, dean of mechanical engineering, or principal, of HoD of a faculty/department in an institution would be easy to find. So, this research does not disclose the names of the institutions.

The above section has given details on the sampling done for the research. Details on the number of respondents or qualitative, quantitative data, number of useful results are discussed in detail in the Results section.

3.11 Method adopted in this research:

This research employed a mixed method approach for data collection. Questionnaires were used for quantitative data collection and semi-structured interviews were used for collecting qualitative data. This section details how the chosen method is linked with the research question, the research process explain the questionnaire and the interview questions.

3.12 Linking the methods with the research questions:

It is important that there is a strong link between the research questions and the methodology chosen, the methods employed to collect research. It is important to carefully consider how the research design adopted links with the research questions (Newman and Benz, 1998). Table 14 shows how the different research questions have been addressed with the method and the tools used for collecting data.

Table 14: Research question and the methods:

No.	Research Question (RQ)	Method adopted	Tool used for data collection
1	RQ1	Quantitative	Questionnaire
2	RQ2	Quantitative	Questionnaire
3	RQ3	Qualitative	Interviews
4	RQ4	Quantitative and qualitative	Questionnaires and Interviews.

Source: Author.

The first research question is about identifying and measuring the critical factors that influence the RP of Coimbatore's engineering academics, so a quantitative approach has been adopted and questionnaire is used for collecting data. This links with the second section (Factors influencing RP) of Table 15, in which Likert scale type questions are used.

The second research question is about measuring the influence of the demographic factors on the RP of the academics, so once more a quantitative approach is adopted with questionnaire as the tool for measurement. This is section 1 of the questionnaire as seen in Table 15.

The third research question is about understanding the 'how' and 'why' EoCIs and AD influence the RP of the academics, since this involves reasoning and explanation regarding the impact of EoCIs and AD on the RP, a qualitative method is appropriate. Semi-structured interviews were used to collect data.

The last research question is a combination of the results from the other three research questions, so a mixed method is appropriate with data from both the questionnaire and interview being used.

3.13 The research process:

a. Initial exploratory interviews (As an addition to the literature review)
b. Design of questionnaire
c. Pilot the questionnaire and revise it
d. Final questionnaire used to collect data
e. Semi structured interviews based on the results from the questionnaires and to understand the reasons behind the results.

Initially a set of exploratory interviews were conducted with academics and the academic managers. These were completely open-ended because it gives a much greater freedom for the respondents to answer and for the researcher to get a rich data about the RP of the academics, which might not have been possible if a structured interview or a questionnaire is used. Also, owing to the limited number of research that

has been conducted in this area as can be seen from the review in chapter 2.3 and (Bakthavatchaalam et al., 2017b, Bakthavatchaalam et al., 2013) it was pertinent that a ‘Theory building approach’ was necessary which utilises a qualitative method such as interviewing. The contents of the interviews were analysed and important were found. Along with this and the variables identified from the literature review - a questionnaire was designed.

The respondents for the questionnaires were academics and academic managers. The questionnaire used closed end and Likert scale questions. The data from the questionnaires was analysed by both descriptive and analytic statistics. The questionnaire is given in appendix 6.

To better understand the results from the questionnaire and how Indigenous Factors (IF) or the Elements of Cultural Identities (EoCI) influence the research productivity of academics, final semi-structured interviews were designed.

The interview data was collected from the academics, managers and the agencies which help academics to conduct research (The agencies were added later, and they were not part of the original planned research). The interview questions used are given in appendix 7.

The below section on the structure of the questionnaire (Section 3.14) discusses the structure of the questionnaire used for quantitative data collection.

3.14 Structure of the questionnaire:

Table 15: An overview of the different sections in the questionnaire and their purpose.

Name of the section	Purpose	Type of questions
Demographics	Understand the demographic details of the respondents	Closed multiple choice questions
Factors influencing RP	Measuring the importance of the variables influencing the research motivation and RP	Likert scale questions
Research productivity	To quantify the RP of the academics.	Fill the blanks with numerals

Source: Author.

The questions in each of the sections were formed based on the literature and the pilot interviews. The background informing the questions in section 1 and 2 are discussed in chapter 2.4. Section 3 was informed by the method chosen in chapter 2.5.

The full questionnaire is given in appendix 6. The first section is about the demographic variables, which are to identify the different demographic groups that the respondents belong to: personal demographics which includes their age group, salary, gender, degrees achieved and working towards etc., professional demographics of the respondents such as their experience, their position, their teaching load, the various roles they play in the institution, the department in which they are working, working hours per day etc.

The first section also has demographic detail of the institutions in which they are working such as the type and the age of the Institution.

The second section of the questionnaire has Likert scale questions based on the conceptual framework. It is a collection of questions based on their personal, professional, organisational, changing academic environment, governing or external bodies and Indigenous factors. The questionnaire also has reverse questions to

identify those respondents who were not careful in reading the questions and then answering them properly.

The third section of the questionnaire has questions on the various elements of research productivity of the respondent over the last 5 years. This included the number of supervisions and the number of papers and conferences, books chapters and patents registered.

The reverse questions in the questionnaire, though not explicit, were formed implicitly based on 'Achievement-motive theory' (Atkinson, 1957). In which the actual questions were formed based on the tendency to wanting to succeed and their related reverse questions were formed based on the tendency of the academics to wanting to avoid failure.

3.15 Changes to the Questionnaire based on pilot:

Based on the feedback from the pilot questionnaire, the following changes were made to the questionnaire. The questionnaire was piloted with 70 random academics from within the target population, of which 47 were received with feedback. The researcher discussed with 37 of those respondents to get a detailed feedback. The other 10 respondents could not be contacted, and their responses were collected from their table. The feedback was clustered, and the following themes emerged, based on which the changes were made (See table 16). The changes were made in the questionnaire and the modified final questionnaire (see appendix 6) was used for data collection.

Table 16: Changes made in the questionnaire based on the pilot:

Suggested changes	Changes made
The length of the questionnaire was requested to be shortened	a. Section 3 was made into a table. Initially there were two questions for the first author and co-author of each of the publication, the table has made it into just one question with two tick boxes. b. Since none of the respondents had received a grant or patent, the 'Grants' question was deleted.
The order of questions in measuring ORP (Sec.3). This was done in the order of expected most likely to least likely.	The order changed to Supervision – conferences – papers – books – chapters and patents.
The column 'Sole author' was requested to be deleted as more than 70% of the respondents stated that it was confusing to have it.	Sole author column was deleted. A disadvantage is that it will result in even a sole paper to be awarded the points of the first author. When the researcher stated that it might be possible to explain the respondents, but it was suggested that the Column be deleted. The sole author column had to be deleted as it was a strong suggestion from the respondents.
A question on the pay grade to be added. Initially it was not added as it might be sensitive.	Question on pay grade added as a check-box question, not as a blank for the respondent to fill in.
The wording choice for the question 'My college is focussed on student results' feels personal and might bias the way the respondents answer	The question was changed to "Colleges are more focussed on student results" thus taking away the personal element.
Rather to having 'Library facilities' and 'Lab facilities' as two different questions, combine them both as one, naming them as 'Facilities in the college'	Grouping them both under the banner 'Facilities' seemed too subjective, so combined the two questions into one as 'The Library and lab facilities in the college'.
Add a question on the lack of colleges' lecturer development plan for the research of the lecturers.	A question called 'The colleges in general lack vision for the lecturers' development and their research' was added.

Source: Author

3.16 Interviews:

Interviews were used to identify how the indigenous factors (Which seem to be very personal) gets affected by the academic dishonesty and how the combination of them influence the RP of the academics. Also, interviews were used for to identify if there were any interactions between these two factors and if there were interactions, then how those interactions influence the RP of the academics.

Qualitative – interview method is useful to generate a rich data, to explore in depth the questions and to understand the reasons 'Why' and 'How' a certain phenomenon was happening (Barbour, 2014, Lodico et al., 2010, Miles and Huberman, 1994). Another advantage of interviews and semi-structured interviews is that there is no time delay between the questions and answers making it very synchronous, non-verbal cues can be noted and that the interviewer can ask questions based on the answers by the respondent (Wengraf, 2001).

3.16.1 Interview with the target population:

Along with the research questions, the results from the quantitative analysis was used to inform the interview questions. The questions used for the interviews can be seen in annexure 7. Initially the target population for the interviews were just the academics (Assistant and Associate Professors) and the managers (Professors, HoDs and Deans / Principals). Professors were included in the 'Manager' group as they are mostly senior academics with managerial jobs allocated to them. Later, interviews were conducted with the 'educational agencies' as well.

The respondents for the interviews were chosen from the group of academics whom the researcher approached for completing the questionnaire in 2015. The researcher went to the same institutions which were a part of the quantitative research.

A detailed description of how many respondents were approached and the number of respondents in different category is given in the results chapter discussing the interviews.

3.16.2 Piloting interview questions:

The interview questions were piloted with five academics, but no changes were made as no suggestions were made requesting any changes. The pilot are not included in the actual interview data that is analysed. There was no piloting with the 'educational agencies' as they were later added.

3.16.3 Purpose of the interview:

Overall, the purposes of interviews were the following

1. To understand how AD and EoCI / Indigenous factors influence the RP of the academics?
2. To identify any links between AD and EoCI and how the link influences the RP of the academics?
3. To have a deeper understanding of the current practices used by the institutions to increase RP and
4. Changes that should be made to increase the RP.

Table 17 gives the details of the questions used in the interviews and the rationale for them.

Table 17: Interview questions and the factors explored:

Question	Factor explored
why do you think that factors like 'Being of service', 'Moral duty', 'God given duty', 'Role model' and 'Devine merit (Punniyam)' important for Overall Research Productivity (ORP)?	Elements of Cultural Identities
How important and **how** do you think the indigenous factors influence the ORP of academics?	Elements of Cultural Identities
Why do academics perceive there is Academic Dishonesty (AD)?	Academic Dishonesty
How does AD influence the ORP of the academics	Academic Dishonesty
How to decrease AD at different levels?	Academic Dishonesty
Has and **how has** the new ranking system of the Ministry of HR Development of India (MHRD) created a need to conduct research?	Changes for increasing RP
What are the changes at different levels that should be made to increase the ORP?	Changes for increasing RP
How does the institution motivate the academics to increase their ORP? - Does it work?	Changes for increasing RP
Should the institution do anything in particular to increase the ORP of academics?	Changes for increasing RP
Do you think that engineering academics in Coimbatore consider conducting research is important?	Generic finishing question

Source: Author

3.17 Conclusion:

Overall, this section of the chapter has looked at the various research philosophies, methodologies and methods that can be applied in research. It has also stated the methods used in this research and justified its application in this research. The chapter

has also linked the research questions with the methodology used and the methods for collecting data.

3.18 Measuring Research Productivity (RP):

The quantity and the quality of research publication is an important indicator of productivity in any academic institution and is considered essential for an academic's carrier progression, promotion, measuring a department's performance, individual academic distinction, evidencing institutional excellence, successfully acquiring research grants, ranking and securing funding etc. (Nygaard, 2015, Ogbogu, 2009, Chen et al., 2006b, Ramsden, 1994). However, measuring Research Productivity (RP) is not as easy and simple considering how important it is (Gibson et al., 2015) and one model of measuring RP does not fit all (Altbach, 2015d).

3.18.1 Issues in measuring RP:

Measuring RP at an individual, institutional and on a wider base is very difficult as it involves considering complex collective determinants. These determinants include what constitutes research productivity? The various measures of their quality etc. The first issue in measuring RP is deciding which indicators to use and which ones to omit (Ramsden, 1994). RP is measured by looking at either the quantity or quality of the work or looking at it as a combination of them both.

Measuring RP has to take into consideration the following crucial elements: How to weigh the different elements of RP? Which type of publication gets more points / scores compared to the other, the position of the author in the research, importance given to research in that institution, demographics of the academics and time period of measurement etc. Adding to this, factors such as the impact factor, the quality of

the journal and the number of citations etc. make it even more complex to measure RP. Over the last few years, various methods have been proposed (See table 18) to measure the quantity and the quality of the research produced. This section looks at the various models proposed for measuring RP and justification for the Overall Research Productivity (ORP) measurement method adopted in this research.

3.18.2 Few of the methods for measuring RP:

1. Measuring only the quantity of the research papers published and conducting a descriptive analysis.
2. Measuring the quantity of various research works such as papers, books, grants and supervision, whereas not looking at the type of journal in which it is published, impact factor or the citations etc.
3. Measuring the number of papers and their quality indicators such as citation index, h-index, i10 index and the journal impact factor etc.
4. Looking at the number of the authors and also the position of the author in the research.

Few of the researches (For sources see table 18) have combined these in different orders to suit their requirement. The current research used a combination of points two and four. The justification for this is also discussed.

3.18.3 Measuring the characteristics of research:

The four important characteristics of research as commented by Harris (1990a) are:

a. Impact,
b. Quality,
c. Importance and

d. Quantity.

Impact is measured by how many citations an article or a piece of research has garnered through bibliometric index such as the h-index, g-index, HC-index and HI-norm (Repanovici, 2011) i10 index etc. with citation being considered as a good way of identifying the value of the research (Abbott et al., 2010, Ramsden, 1994).

Both quality and importance of a research are difficult to assess and it depends on expert judgement. Number of citations may contribute to identifying if a paper is important or not, with important papers being cited many times. CLpn (Combes and Laurent, 2003) formula is a different method that uses both the number of papers and the weightage of the journals they are published in (Horodnic and Zait, 2015). This research does not consider the number of citations, as it can be easily manipulated and also that only a small percentage of articles are cited sufficiently (Rauber and Ursprung, 2006), this is one reason for not using citations.

Quantity of research produced is the quickest and the easiest of the four to measure. It is simply measured by the number of publications which Ramsden (1994), comments as being far from ideal.

3.18.4 RP measurement adopted in this research and justifications:

In this research, work of Harris (1990a) was initially considered as a potential framework: measuring the quantity, quality and the impact of the work. However, it was decided a questionnaire enquiring about the impact of each of the research work will be too long and complex, as it would require the respondents to remember or to have access (at the time of filling the questionnaire) to the impact factors and citation indices of each of their publications.

There was a possibility of asking for the H-index or google scholar index of respondents' research works in the questionnaire, but the pilot revealed that most of the Indian academics did not have google scholar page or a scopus page or did not know the indices of each of their paper.

Also, if an academic had written for example 4 papers, then he/she will have to report the impact factor of each of them – making it tiresome for the respondent and thus increasing the non-responses and/or partial responses. This is supported by Manjunath et al. (2011) who comment that if the researcher uses a self-designed questionnaire to measure RP, then it would be very difficult to obtain all the essential data on every publication made by the respondent without compromising confidentiality.

In order to get over this issue and to measure both the quantity and the quality (Composite indicators) of research work, Horodnic and Zait (2015) made a separate identification code for each of their questionnaire forms from which they were able to trace the respondent. They used the code to measure each of the respondent's RP by looking at databases such as the Romanian national database; the University's website, repositories, and previous year research records of its academics which are publicly available. From this, they were able to calculate research output, journal impact factor, citation index, the number of authors, position of the authors etc. remotely without the involvement of the respondent.

Similarly, Rørstad and Aksnes (2015) used the Norwegian national publication database called CRISTIN, from which they were able to gather all possible data regarding both the quantity and the quality of the work.

This research could not make use of the method adopted by Horodnic and Zait (2015) or that of Rørstad and Aksnes (2015) as there was no central repository of the academics' research works in India.

Accessing research productivity data in developed countries is easier as most of the data is available online either on the staff page or on the institutions' webpages. Whereas data on this subject is limited in the developing countries (MHRD, 2016, Dakik et al., 2006). For studies such as this, it is just the quantity of the research output that can be measured.

Even though this approach misses out on a range of data such as citations, type of journals, impact etc. of each of the research output, this is the most used and simple method to collect indicators to measure RP - especially when a central repository or an extensive data base of the research outputs are not kept or available (Costas and Bordons, 2005).

In this research, data on the impact, citations etc., were not asked for in the questionnaire due to the reasons mentioned.

3.18.5 Indicators used for measuring RP:

Few of the methods used to collect data and the indicators used for measuring research productivity by various authors are given in the table 18.

Table 18: Indicators to measure RP from the literature:

Papers on measuring RP	**Method used to collect data on the indictors (Books, journals etc.)**	**Indicators used to calculate RP**
Chen et al. (2006b)	Self-reported qr. – does not look at 1st, 2nd author just no. of publications.	No. of books, chapters, cases published, journal and grants.

Callaghan (2015)	Looked at ISI, IBSS, DHET webpages.	Journal papers
Ogbogu (2009)	Self-reported qr. – does not look at 1st, 2nd author, just no. of publications.	International Journals and conferences
Dakik et al. (2006)	Online search, no. of publications, quality and impact are considered.	Case reports, letters to editor, reviews, articles, editorials.
Ramsden (1994)	Self-reported qr. – does not look at 1st, 2nd author, just no. of publications.	Received internal, external grants, supervision of masters, PhD, informal research with colleagues, joint research participation, conferences and contact with colleagues overseas.
Brocato and Mavis (2005)	Self-reported qr. – does not look at 1st, 2nd author, just no. of publications.	Peer reviewed journals, art works submitted, art works accepted, national conferences, national grants for the last 2 years.
Repanovici (2011)	Exploratory study, ISI web of science and faculty's annual reviews.	Books, articles, reports and research contracts.
Wootton (2013)	Search webpages on: medMed and MedLine.	Grants, papers and supervision.
Murray (2014)	Does not say	Articles, books, chapters, supervising MSc and PhD students.
Gibson et al. (2015)	Scopus data base, Journal Citation and reports	Papers, their citations and the journal's impact factor.
Baskaran (2013)	Web of science	Papers published
Gibson (2000)	EconLit database	Papers from different levels of journals have been taken and each of them were converted to a standard no. of pages according to the quality of the journal.
Rørstad and Aksnes (2015),	Norwegian publication database	
Jasmine et al. (2011)	Web of science, 1999-2010.	Only articles
Antonio-García et al. (2014)	Self-reported qr.	Only articles
Okonedo et al. (2015)	Self-reported qr.	Books, chapters, co-authored books, monographs, occasional papers and conference proceedings.
Sahoo et al. (2017)	ABS-Scorpus and staff webpage from 1968-2014.	Papers
Caminiti et al. (2015)	Looks at impact factor and author position in the institution. It is a 5-year study.	Grants, papers, supervision, projects, patents, training, submitted and accepted research proposals, being members of committee, articles, books and chapters
Arif (2015)	University data base and staff page for 5 years.	Papers
Olmeda-Gómez and de Moya-Anegón (2015)	Scopus search, looks at impact. It is a study from 2003-2012 based on 20 countries	Papers, reviews, letters, congress communications, notes, short surveys.

Horodnic and Zait (2015)	National and University database	Conferences, supervision, papers, books, grants and patents.
Paul et al. (2015)	Self-reported qr. and interviews	Products developed, teaching activities involved, extension activities undertaken, recognitions, awards won and research activities undertaken.
Harris (1990b)	Not stated (Possibly University and departmental database)	First, second and other ranked journal articles, research books, other books, chapters in research books and chapters in other books.

Source: Author

From table 18, it is evident that there is no single or a generalised guideline to selecting the indicators for measuring RP. Wootton (2013) points out that there is no correct way for choosing the indicators and that their selection should change with the requirement of the research.

Wootton (2013) constructs a simple method of measuring the RP score using indicators,

$$R = g + p + s,$$

Where 'R' is the RP score; 'g' is the score for the grants awarded; 'p' is the score for publications and 's' being the score for supervising research students.

A modified version of Wooton's method has been used in this research, where the total research productivity score of an academic is calculated as:

$$ORP = s + p + pt,$$

Where 'ORP' is the overall research productivity score; where 's' is the score for supervising research students, 'p' is the score for the publications which include publications of journal articles, books, chapters and conferences. 'pt' being the score for patents awarded. Initially, points were awarded for grants received, but from the pilot data collection and advice from the pilot respondents, it was removed as the

academics rarely apply and get grants at least in the target population. The indicators used for measuring ‘s’, ‘p’ and ‘pt’ are given in the table 19 based on IIPS and NIRF.

3.18.5.1 Time period of RP measurement:

The majority of the researchers such as Caminiti et al. (2015), Murray (2014), Kranzler et al. (2011), Dakik et al. (2006) and Wagner et al. (1994) comment that five years provides a good measurement of time period for measuring RP. Few academics have measured RP during a 2 year period (Brocato and Mavis, 2005) and some have used 3 years. Rørstad and Aksnes (2015) and (Paul et al., 2015) looks at a seven-year period measurement. In this research, RP was measured over a five-year period.

3.18.5.2 Weighting scheme for the indicators of RP:

The following section looks at some of the literature on the weighing schemes used for measuring RP and then justify the weighing scheme chosen in this research.

After deciding the indicators for measurement of ORP, the next important decision to make is the relative or absolute weightings to be given for each of the research works. Some of the important issues in weighing the research output as raised by Nygaard (2015) include - if books should be given the same score / importance/points as journal papers and chapters? If co-authored works get the same points as solo-authored works? And what is the best way to compare RP across institutions, disciplines and countries?

Looking at the available literature on measuring RP, in Romania, another developing country, the Universities use ‘Quality Assessment of Scientific Research Activities in Universities’ (QASRAU). The QASRAU utilises a combination of factors such as 1. The funds raised for scientific research, 2. Supervision of research students, 3. Articles

in national and international journals, 4. Books and 5. Patents, with specific weighting given to each of the indicators. CLpn method tends to converts each paper into its equivalent page numbers and takes into account the number of authors (Rauber and Ursprung, 2006) .

Murray (2014) uses a productivity unit count for measuring RP. A point based system is used. 60 points for a journal paper, 100 points for book etc. He gives more points for a book compared to a paper. If a paper has 2 authors, then equal points are shared between the both.

Even though there are a lot of weighing schemes available, the academics in India would now be measuring their RP according to the UGC's (University Grants Commission) Academic Performance Indicator score (NIRF, 2015, IIPSIndia, 2010) that was published in 2015. This is a new scoring system announced by the Government and it is gradually being nationalised as one standard for the entire nation. So, a modified version of the API was used in this research. Had the API policy document been published before the data collection, the researcher would have designed the questionnaire parallel with it. But still, the questionnaire used in this research measures all the elements of RP which made it very easy to adopt the 'measuring RP' section with the API.

3.18.5.3 RP according to APIs of college teachers, UGC India:

API score for research was calculated by adding the scores for the number of papers, books, chapters, sponsored projects, research guidance and research trainings attended, with each of the indicators having a different weighting. This research used papers, books, chapters, research guidance and patents. Table 19 based on NIRF

(2015) and IIPSIndia (2010) provides a detailed description of the points / scores given to each of the elements of RP.

Table 19: Scores for different elements of RP:

No.	**In the last 5 years**	**Points allotted per piece of work**	**Of which I am the first Supervisor (60% of marks)**	**Of which I am the co-Supervisor (40% of marks)**
1	The no. of Under- Graduate projects supervised	**1**		
2	The no. of Post- Graduate projects supervised	**3**		
3	The no. of PhD thesis supervising / supervised	**8**	**4.8**	**3.2**
No.	**In the last 5 years**	**Points allotted per piece of work**	**Of which I am the first author (60% of marks)**	**Of which I am the co-author (40% of marks)**
4	The no. of national conferences attended	**7.5**	**4.5**	**3**
5	The no. of International conferences attended	**10**	**6**	**4**
6	The no. of papers published in **national level Annexure 2 journals**	**7.5**	**4.5**	**3**
7	The no. of papers published in **national level Annexure 1 journals**	**10**	**6**	**4**
8	The no. of papers published in **international level Annexure 2 journals**	**15**	**9**	**6**
9	The no. of papers published in **international level Annexure 1 journals**	**20**	**12**	**8**

10	The no. of books written/edited	**30**	**18**	**12**
11	The no. of chapters authored in books	**7.5**	**4.5**	**3**
12	The no. of patents registered	**25**	**15**	**10**

Source: Author

3.18.6 Rationale for selecting the RP scoring system:

UG supervision has not been given any points in API scheme (NIRF, 2015), but this research gives 1 dimensionless point for the same. This was to keep in line with the feedback from the pilot questionnaires, where it was mentioned that UG supervision is an important task that most of the staff do which sometimes do get into conferences and journals. Since UG projects are done in groups, 1 mark is allocated for each of the projects which may have more than one student. There is only one supervisor for both UG and PG projects, so the co-author section is not applicable and so greyed out.

One of the questions that might arise is - why is this research only considers first and second authors and not sole author? Initially, there was a sole author column in the questionnaire which was later removed as the pilot strongly suggested that it created a lot of confusion for respondents.

To get a clear picture on the issue of 'sole author' being dropped, the researcher was interested in knowing how many Indian academics wrote sole authored papers. A study by Baskaran (2013) reviewed papers from a South Indian University from 1999 till 2011 found that 96.64% of the papers were multi-authored and only the remaining 3.36% of the papers were single / sole authored.

Another work by Sahoo et al. (2017) on Indian premier institutions shows that there is a growing trend of multi-authorship. This is supported by Arif (2015) who show that 98% of the papers were co-authored or multi-authored in India. These along with the

similar suggestions from the pilot were the major reasons to delete the sole-author column.

This research uses only first and co-author categories, 60% of the points were awarded for first authors and 40% to the co-authors, be they second, third or the n^{th} author (Wootton, 2013). This is for simplicity and to not overcomplicate the questionnaire with many columns. Howard et al. (1987) uses a similar scheme of giving 60% of the score to the first author and 40% to the second author. But they also give points for multi authored papers with reducing percentage of points for third, fourth and fifth authors etc. The API scores also gives 60% of the points for the first author and the remaining 40% of the points is shared between all the other authors.

3.18.7 Conclusion:

The ORP of the academics was measured using the weighing scheme as discussed above. So, in terms of the quantity, the questionnaire measured various research elements such as journals, books, conferences, supervisions, grants and patents. Also, the questionnaire looks at the position of the authors in the research under consideration.

In terms of quality, the paper distinguishes conferences and publications as national and international - rather than just asking the number of journal articles published or the conferences attended.

On the whole, it should be noted that none of the metrics are perfect for measuring RP and if they suit the researcher they may be considered appropriate (Brocato and Mavis, 2005), especially since the scores or weights are dimensionless. In addition, Abbott et al. (2010) and Noorden (2010) criticise the growing number of metrics commenting that rather than giving clear guidance, metrics puts a lot of stress on the academics and also they suggest that the performance of an academic cannot be summarised in a number.

This chapter has explored the various methodologies and determined the methodology that would be suited to this research. The next chapter looks at the various quantitative and qualitative results based on the data collected.

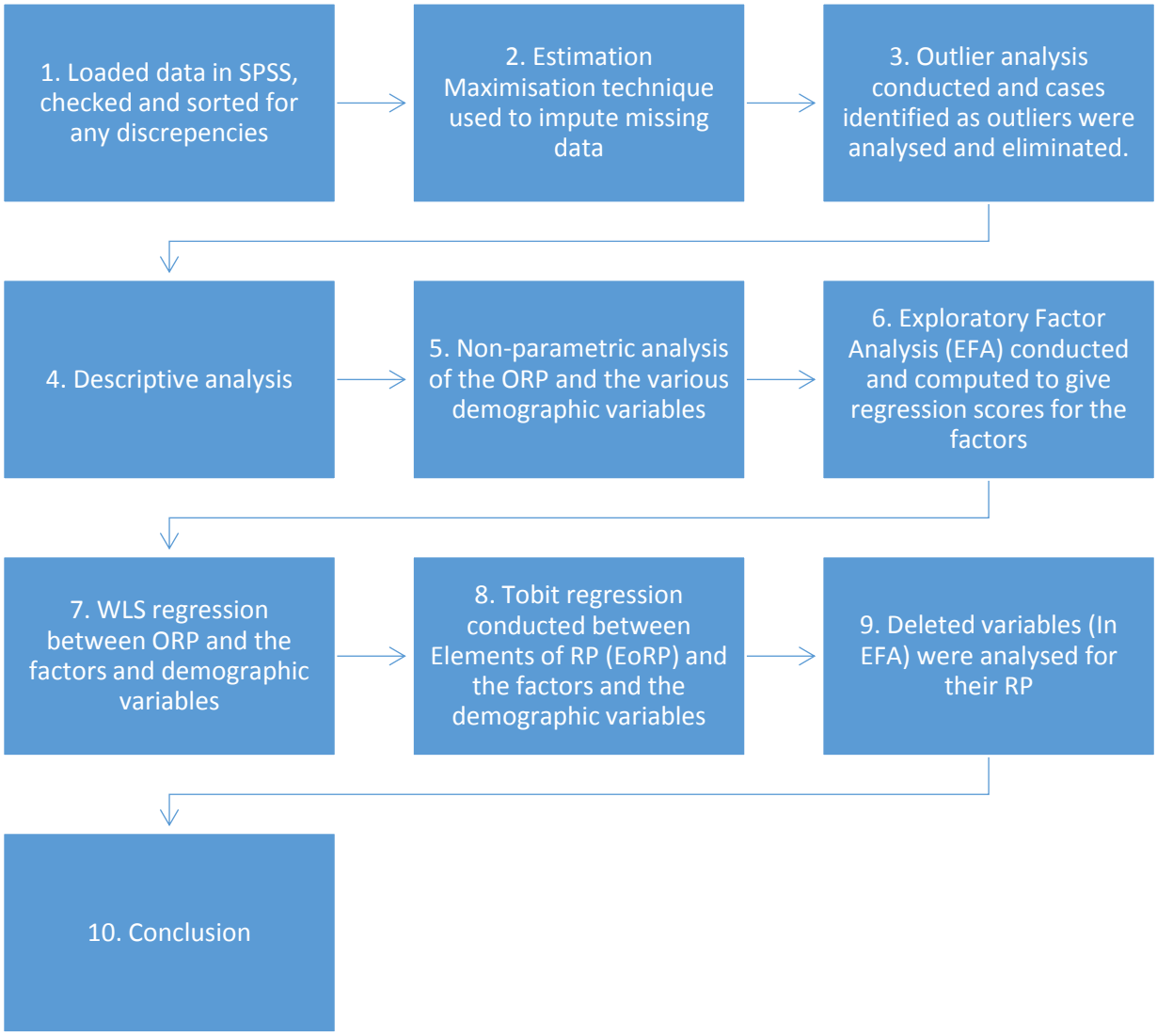
Chapter 4: Results:

Following the methodology, this chapter looks at the various analyse of the data. Chapter 4 is divided into two 4.1 and 4.2. Chapter 4.1 looks at the different quantitative results and the qualitative results will be discussed in chapter 4.2.

4.1 Quantitative results:

Data handling and analysis were conducted in the following order as seen in Fig.19.

Fig.19: Steps in analysing quantitative results:



Source: Author.

Initially, the questionnaire was designed in surveymonkey.com and the link was e-mailed to academics in June-July 2015 but despite three reminders, there were no responses from any of them. The researcher called four of the principals / deans of the institutions to understand the reason for no response to which they strongly recommended visiting the institutions directly commenting that the academics tend to receive several such questionnaires and usually they are deleted. So, the researcher travelled to Coimbatore in July 2015 and spent 5 weeks collecting data face to face.

Initial contact was made by calling the institution and explaining to the principal / dean of the institution or the Head of the Department (HoD) about the research and requesting permission to meet their staff members and hand out the questionnaires directly. Twice the principal or the HoD stated that they would distribute the questionnaire and collect it for the researcher, this offer was politely refused, and it was explained that such an action might bias the responses and/or the confidentiality. The researcher visited the institutions and handed out all the questionnaires directly to the academics and they were given a week to complete them.

The researcher spent an entire day at most the institutions contacting academics in different departments. Most of the questionnaires were handed back to the researcher on the same day. The researcher visited the institutions as a follow-up after a week to collect the remaining completed questionnaires. The non-responding academics were either unavailable or were too busy to finish it. In such cases, the researcher requested the academics to e-mail the finished questionnaire by sending a mobile phone photograph of the sheets of paper. There were no responses through e-mail.

643 questionnaires were distributed of which 421 were handed back on the same day during which they were distributed. Only 25 questionnaires were handed in during the follow up visits. In total 446 responses were received, with a response rate of 69.3%.

Of the 446 responses, 324 were usable. A cut off limit was set so that any questionnaire that had more than five missing data were to be discarded and also any responses that were suspicious were discarded. For example, some of the questionnaires had all ‘Strongly agree’ or ‘Strongly disagree’ etc., for all the questions including the reverse questions.

Therefore, the overall usable response rate was 50.38%, which is considered good for a survey-based method. The nine-step analysis of the quantitative data is seen from 4.1.1 to 4.1.9.

Step 1:

4.1.1 Data coding and sorting:

The data was initially coded using the Microsoft Excel software package. Coding was done by substituting numbers for each of the categories. Coding was different for each of the three sections of the questionnaire. Section 1 is the demographic detail of the respondents. Section 2 is Likert scale questions about the various variables that influence the academics’ ORP with section 3 being the elements of RP.

For section 1: data was coded for instance: 1 - male and 2 - female, 1 - Single, 2 - married and 3 – divorced etc. If the respondent did not respond to the question, it was coded as 99 to indicate missing data.

For section 2: The Likert scale was coded in the descending order as 1 – strongly agree, 2 – agree, 3 – disagree, 4 – strongly disagree, 77 – not applicable and 99 – left blank / missing data. Usually the data is coded in the ascending order as 1 being strongly disagree and 4 being strongly agree, but since in this research it is coded in reverse, interpretation of the regression results will have to be considered in the reverse too. Out of curiosity, the researcher also coded the data in the ascending order and conducted the analysis, and the results were the same, but with opposite signs (positive or negative).

For section 3, each of the elements of RP were given a score according to the table no. 19, which is based on a modification of the Ministry of Human Resource Development (MHRD) initiative. Overall Research Productivity was calculated as the sum of the scores of the established individual elements based on their weightings (See table 19).

The coded Excel document was loaded into SPSS version 22 and adjusted to make the dataset compatible with SPSS. All further analyses were carried out in SPSS version 22 and in version 23. STATA was used for Tobit analysis.

Step 2:

4.1.2 Checking the data:

Before starting any analysis, the integrity of the coding was checked to ensure that the data has been coded correctly and there is no manual error in coding (Field, 2009). To do this, SPSS was used to check if all the questions including demographics and Likert scale questions were within the upper and lower limits. For example: rather than coding 4 for strongly disagree, if any values were entered as 44 by mistake; or rather

than having 4 age groups, if there was a 5th age group coded by mistake. This was done by looking at the frequency tables of each of the variables. In total, 17 instances of coding errors were found. To rectify this, the originals were pulled and the data was correctly entered. After this, all the data fell within the expected range.

To check if the values were entered correctly without any manual error, SPSS was used to generate random numbers and the corresponding random sample of questionnaires was selected. In total, 25% (n=81) of the questionnaires were selected and double checked for any errors. No manual errors were found in the coding. A further 5% (n=16) of the questionnaires were pulled again and checked for coding errors. There were no errors found. Overall, n= 97 questionnaires were checked making it a 30% of the total sample.

4.1.2.1 Missing value analysis:

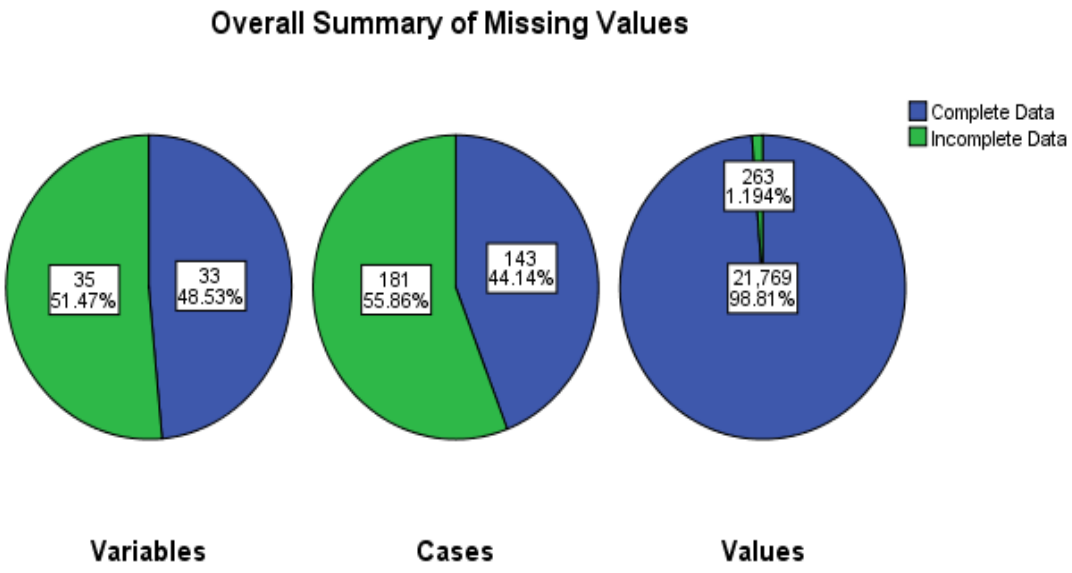
The summary of the missing values (Fig.20) shows that 48.53% of all the variables (age, pay scale, no. of papers published etc.) had completed data. The remaining 51.47% (n = 35) had at least one respondent not responding to that particular variable.

In terms of the respondents, 44.14% of the respondents/cases had filled in the questionnaire completely, whereas 55.86% had not filled at least one question. But in the overall data, 98.81% (n=21,769) of values were completed and only 1.194% (n= 263) values were missing.

The variable ‘Academic link’ in the questionnaire (See appendix 6) was not answered by 40.1% (n= 130) of the respondents (See table 65 in appendix 5). This may be due to the positioning of this question in the questionnaire. The researcher presumes that if this question were placed along with other questions in the demographic section – it

might have had a higher response. Since it was placed at last in the questionnaire respondents might have overlooked it. This was taken as a critical feedback / lesson from the questionnaire design. Similarly, the variable 'Better husband or wife' has 7.7% (n=25) of values that were missing. Since these two variables had a lot of missing data, they were eliminated from the analysis. All the other variables had less than 5% of missing data.

Fig.20: Overall summary of the missing values:



Source: Author.

4.1.2.2 Questions with missing values:

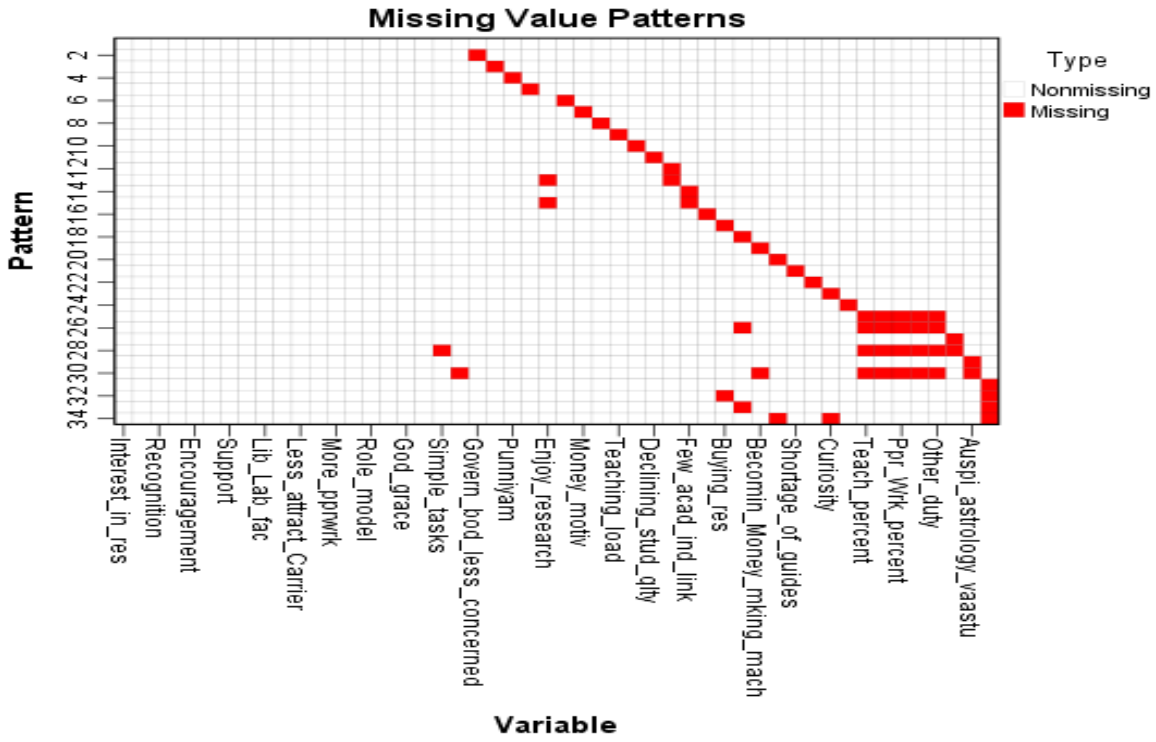
Table 65 (See appendix 5) shows the detailed summary of the missing values. For the "percentage of duties" (i.e., teaching, research, paperwork etc.), there were 6 respondents who had not answered any of the questions related to the percentage of their teaching, their percentage of research etc. All the other variables have less than 4% of missing values each.

The missing value pattern diagram (Fig.20 and Fig.21) was drawn in SPSS to see if any discernible pattern could be detected. The questionnaires with missing values

were pulled out and carefully studied to see if there are any striking features common to them. Except for the six respondents not answering the “percent of the duties”, no other pattern was seen.

The only thing of note was that everyone had filled section 1 of the questionnaire which had no missing values and that only section 2 had missing values.

Fig.21: Missing Value Patterns



Little’s MCAR (Missing Completely At Random) test was conducted (see Fig. 21) to make sure that the values were indeed missing at random (Schreiber et al., 2006, Graham, 2009). MCAR test yielded a Chi-sq. of 1620.455 (df = 1589 and a significance value (p) of 0.286). The p value is greater than 0.05 – showing that the data are indeed missing randomly (Little, 1988).

The important and primary tables and figures are shown in the thesis section and the associated tables and figures are given in the appendix.

4.1.2.3 Imputing missing data:

In order to impute the missing values, Estimation – Maximisation (E-M) was used. Other methods for dealing with the missing values include:

1. Last observation carried forward,
2. List-wise and pairwise deletion,
3. Imputing with arithmetic means,
4. Imputing with 'Expectation Maximisation' (E-M) technique and
5. Imputing with 'Multiple Imputation' (MI) technique.

Each of the methods have their own inherent advantages and disadvantages. 'Last observation carried forward' is as simple as imputing the missing value with the data of the previous respondent. But the imputation depends on what the previous respondent has answered, and it can change based on how the responses are arranged (ascending, descending, based on a variable etc.), even though is convenient it is not very reliable (Enders, 2010). The 'list-wise deletion' technique deletes all the cases with any missing values. Though this is simple and is easy, Byrne (2013) points out that this method reduces the sample size, statistical power of analysis and results in errors. In this current dataset if the deletion method were used, only 143 questionnaires would have been used, severely limiting the number of responses.

In the pairwise deletion method, rather than deleting the entire case, the analysis does not use the missing value in any analysis which involves the missing variables. For example, if respondent 1 has not answered the 'percent of teaching', but has answered all the other questions, then only the missing variable of that respondent will be excluded from the analysis and all other responses from the respondent will be analysed. The problem with this approach is that the sample size will vary across the

variables and the presence of different sample sizes for each of the variables might bias the analysis (Byrne, 2013).

Ad-hoc methods such as 'imputing with arithmetic mean' - a simple method which the researcher initially planned to use; result in the missing values converging on the centre of the distribution of the curve (at its mean value) resulting in too many centrally located values (Byrne, 2013, Rovine and Delaney, 1990).

Expectation-Maximisation is an iterative process that produces maximum likelihood estimates for each of the missing values. The process consists of two steps, 'E' and 'M'. In the 'E' stage, the expected values of the missing data are calculated based on the available means and parameters. In the second stage 'M', the Maximum Likelihood (ML) estimates are found and substituted for the missing values (Hill, 1997). One of the disadvantages with this method is that the standard error of the imputed data diminishes as it is computed based on the existing values (Allison, 2001).

Even though Hill (1997) states that more complex methods such as ML and MI are used for inferential statistics, in this case the number of missing data is very small (as can be seen from table 65 (See appendix 5) and so E-M was chosen and used.

One of the requirements for E-M is that the data should be MCAR which was tested by Little's MCAR test which showed that the data is indeed MCAR ($p = 0.286$, greater than 0.05). E-M technique was used and computed the missing values and the data set was re-named as 'After imputation'.

Step 3:

4.1.3 Outlier analysis:

The data was tested for potential outliers to be eliminated before starting analysis. Outlier analysis was done by looking at the distribution of the ORP scores, Mahalanobis distance, Cook's distance and Leverage values (Fung et al., 2002, Rousseeuw and van Zomeren, 1990, Cook, 1977).

Outliers are data that appear to be inconsistent with the remaining data. Outliers exhibit abnormal data behaviour deviating from the natural data variability (Peña and Prieto, 2001). Along with identifying outliers the Overall Research Productivity (ORP) was also tested for normality. The normality of data was checked by histograms, Q-Q plot, Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) test (Pett, 2015, Neave and Worthington, 1988).

The Q-Q plot (Fig.43, see appendix 4) and the histogram (Fig.42, see appendix 4) clearly shows that the observed values deviating from the expected normal curve with several outliers. The Q-Q plot compares the given dataset with an imaginary dataset that would be an ideal normal distribution (Miles and Shevlin, 2001).

From table 20 it can also be seen that the mean of ORP is 60.95 with a range of 768.75, whereas the median is 36.25. This difference between the mean and the median is a direct result of the outlier data pulling the mean to the right-hand side of the curve in Fig.42 (See appendix 4). So, median was selected as a better reflection of the measure of central tendency.

Outliers were divided into two categories, outliers based on the dependent variable (ORP) score and multivariate outliers based on the combination of nominal and ordinal variables in the data.

Table 20: Descriptives of the ORP with the outliers:

Descriptives of the ORP with the outliers		
ORP		
N	**Valid**	324
	Missing	0
Mean		60.9522
Median		36.2500
Mode		.00
Std. Deviation		76.64283
Variance		5874.124
Minimum		.00
Maximum		768.75

Source: Author.

4.1.3.1 ORP outliers:

The Q-Q plot and the histogram (Fig.45, 46. See appendix 4) showed 5 clear outliers, all the other scores were within ORP 300. So, a cut off ORP score of 300 was set in SPSS to eliminate those outliers that were influencing and skewing the mean score. Five of the Case nos. / responses (Based on the author's coding and not the default case no. produced by SPSS), 306, 240, 208, 322 and 104 were deleted from the dataset.

4.1.3.2 Multivariate outliers:

Multi-variate outliers are the data that does not have a similar combination of values for a number of variables when compared to the other data points. Unlike a univariate outlier which is an unusual / extreme point in one variable, multi-variate outliers are a result of more than one variable (Barnett and Lewis, 1994).

In order to identify multi-variate outliers, Mahalanobis distance was calculated for each of the respondents' 21 nominal (each of the % of duties were considered as indivudual variables) and 45 ordinal variables (in total 66 Independent Variables). This analysis considers all the variables together from each of the respondents to detect outliers, thus named aptly as a Multivariate outlier analysis. Note that these are not the outliers for the RP elements or the ORP, but the 66 IVs considered together (Grande, 2015, Meyers et al., 2013).

If the P - value is less than 0.001, then it was considered as an outlier. Based on the P-value, Mahalanobis distance of 108.00 was identified as the critical value. Anything above that would be a multivariate outlier. Based on the analysis, 12 respondents were identified as outliers. Case nos. / respondent nos. 33, 57, 163, 183, 197, 200, 213,

227, 254, 303, 323 and 329 were eliminated. Cook's distance and leverage values are calculated during regression.

In total, 17 responses were eliminated as outliers. Overall, the number that will be analysed after eliminating the outliers will be 324 responses – 17 outliers = 307 responses. The deleted 17 responses were carefully studied to see if there is any specific characteristics that is identifiable, but no obvious patterns were found.

4.1.3.4 Selecting cases:

A filter was created in SPSS by which only those cases with an OPR value less than 300 and a Mahalanobis distance of 108.00 were selected.

Table 21: Descriptives of the ORP without the outliers:

Statistics		
ORP		
N	**Valid**	307
	Missing	0
Mean		55.0453
Median		35.0000
Std. Deviation		55.48175
Variance		3078.225
Range		272.75
Minimum		.00
Maximum		272.75

Source: Author.

The new histogram (Fig. 45, see appendix 4) and Q-Q plot (Fig.46, see appendix 4) (With a cut off score of 300 and eliminating the multi-variate outliers) having eliminated

the outliers is shown in table 21. Also the stem and leaf plot was checked to see the distribution (Fig.44, see appendix 4).

After deleting the previously mentioned 17 cases, table 21 the range has reduced from 768.75 to 272.75 and the mean has shifted from 60.95 to 55.04, which shows the effect the outliers had on the mean. The median value only shifted from 36.25 to 35.00.

4.1.3.5 Tests of normality

Even after deleting the outliers, a visual inspection of Fig. 45 and Fig. 46 shows that the ORP score is still skewed and is not normally distributed. In order to test the normality of the data statistically Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests were conducted (Table 22).

As the P-value (sig.) of both K-S and S-W tests are both less than 0.05, it is evident that the data is not normally distributed (Conover, 1980). Whenever the data is skewed, they should either be transformed to a normal distribution or non-parametric statistics should be used (Pett, 2015, Field, 2009). The researcher tried to transform the data using inverse and log transformations, but since the data was so skewed (as can be seen from Fig.45, (See appendix 4) the transformations still did not result in normal distribution of the data.

In cases of non-normal distributions, (Pett, 2015, Kerr et al., 2002, Everitt, 1992) recommends non-parametric tests and not parametric tests – as the parametric tests are based on the assumption that the distribution is normal.

Table 22: Tests of normality after removing the outliers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
ORP	.161	307	.000	.817	307	.000
a. Lilliefors Significance Correction						

Source: Author.

Step 4:

4.1.4 Demographics of the respondents:

The first section of the questionnaire was to understand the demographic distribution of the respondents. The demography of the respondents is shown in the table 23 with the individual and the cumulative %. The corresponding bar charts for table 23 were initially thought to be shown (Similar to Fig. 47) but was decided against it as it would be just repetition of data.

Table 23: Demographics of the respondents

Variable	**Frequency**	**Percent**	**Cumulative Percent**
Gender			
Male	202	65.8	65.8
Female	105	34.2	100.0
Age **group**			
less than 25 years	34	11.1	11.1
25 to 35 years old	216	70.4	81.4
35 to 45 years old	43	14.0	95.4
45 to 55 years old	10	3.3	98.7
55 years and older	4	1.3	100.0
Marital status			
Single	133	43.3	43.3

Married	174	56.7	100.0
Divorced / widowed	0	0	100
Do not wish to say / disclose	0	0	100
Type of institution			
Affiliated Institution	189	61.6	61.6
Autonomous Institution	85	27.7	89.3
Deemed University	33	10.7	100.0
Age of the institution			
Less than 5 years old institution	33	10.7	10.7
5 to 10 years old institution	107	34.9	45.6
11 to 15 years old institution	84	27.4	73.0
16 to 20 years old institution	56	18.2	91.2
more than 20 years old institution	27	8.8	100.0
Position in the institution			
Assistant Professor	264	86.0	86.0
Associate Professor	23	7.5	93.5
Professor	7	2.3	95.8
Head of the Department / Dean of the institution	11	3.6	99.3
Others	2	.7	100.0
Teaching experience			
Less than 5 years	162	52.8	52.8
5 to 10 years	98	31.9	84.7
11 to 15 years	35	11.4	96.1
16 to 20 years	7	2.3	98.4
more than 20 years	5	1.6	100.0
Pay grade in Rupees			
Less than 25K per month (1K = 1000)	116	37.8	37.8
25 to 35K per month	117	38.1	75.9
35 to 45K per month	26	8.5	84.4
45 to 55K per month	10	3.3	87.6
55 to 65K per month	22	7.2	94.8
More than 65K per month	16	5.2	100.0
Industrial experience			
Yes	102	33.2	33.2
No	205	66.8	100.0
Degrees abroad			
Yes	0	0	0
No	307	100.0	100.0
Degrees achieved			
UG	6	2.0	2.0
PG	264	86.0	87.9
MPhil	9	2.9	90.9
PhD	28	9.1	100.0
Degrees working towards			
Not applicable	194	63.2	63.2
PG	2	.7	63.8
PhD	111	36.2	100.0
Working hours per day			
Less than 6 hours/day	20	6.5	6.5

6 to 7.5 hours/day	53	17.3	23.8
7.5 to 8 hours/day	142	46.3	70.0
More than 8 hours/day	92	30.0	100.0
Teaching related hours per week			
Less than 7 hours/week	17	5.5	5.5
7 to 14 hours/week	59	19.2	24.8
15 to 23 hours/week	164	53.4	78.2
More than 23 hours/week	67	21.8	100.0
Residency from the campus			
In campus	31	10.1	10.1
Within 5 Km radius from the campus	60	19.5	29.6
Within 20Km radius from the campus	101	32.9	62.5
More than 20 Km radius from the campus	115	37.5	100.0

Source: Author

The respondents' gender ratio is 65% male: 35% female. 46% single and 54% married. The respondents were mostly young professionals with 81.1% of them being less than 35years old and 95% of them are below 45 years old. 52% of them have less than 5 years of teaching experience and 84.7% of them had less than 10 years of teaching experience. Most of the respondents are in the entry level lecturing position, with the data showing that 86% of the respondents are Assistant. Professors with only 6% of them being Professors or higher. Regarding the pay/month, 75.9% of the respondents earn Rs.35K or less which is the recommended UGC pay for asst. Professors.

91% of the respondents had a Post-Graduate (PG) degree and only 9% having a PhD. 36.2% of them are pursuing a PhD whereas the others have either got a PhD or are not working towards it. This clearly shows that the bulk of the respondents are new lecturers who have started their lecturing profession after completing their PG and among them, just above a third of them are pursuing their PhD.

All of the respondents have graduated in India with no one having studied any of their degrees abroad. If there were any potential respondents who have graduated abroad,

it would have been interesting to see then how their ORP differed from the locally graduated respondents.

33.2% of them have had previous industrial experience and the remaining 66.8% started in academia as their first professional job. In terms of the age of the institution, the demography is well spread, 45.6% of the responses were from institutions less than 10 years and 91.2% from institutions less than 20 years and 8.8% of the institution were more than 20 years old. So most of the responses were from either new or institutions that are in their adolescence.

61.6% of the respondents are from affiliated institutions and 27.7% of them are from Autonomous and 10.7% of them are from Deemed Universities. Reflecting the range of institutions in Coimbatore.

76.3% of the respondents worked for more than 7.5 hours/day with 30% of them working more than 8hrs/day. In terms of the number of hours of teaching per week, 21.8% of them teach for more than 23hrs/week and 53.4% of them are teaching between 15 to 23hrs/week, which is considered as a moderate to high teaching load.

At last, 29.6% of the respondents lived within 5km radius of their institution and the others commuted to the institution with 37.5% of them commuting more than 20km.

Table 66 (See appendix 5) shows the correlation between different demographic variables. Any correlations greater than 0.4 (P= 0.01) have been highlighted. It can be seen that age group is moderately correlated with marital status (0.434, p=0.01), pay grade (0.471, p=0.01) and the degrees achieved (0.407, p=0.01). Age group is strongly correlated with the teaching experience (0.667, p=0.01). With the teaching experience moderately correlated with the marital status (0.459, p=0.01).

There is a positive correlation between the degrees achieved and the pay grade (0.504, p=0.01). A moderate to low correlation between degrees achieved and teaching experience (0.432, p=0.01) and the position in the institution (0.435, p=0.01).

An obvious correlation is between the age group and the teaching experience (0.667, p=0.01), similarly between age group and marital status (0.447, p=0.01). But these are of no interest as older academics are anticipated to be married considering that this research is based in India. In terms of the percentage of duties (Fig.31), percent of teaching is negatively strongly correlated (-0.556, p=0.01) with the percent of paper work and moderately negatively correlated (-0.439, p=0.01) with the percent of student monitoring. Similarly, the percent of teaching and the percent of research are moderately negatively correlated (-0.301, p=0.01).

4.1.4.1 Representativeness of the sample:

In the current sample, 34.2% of the respondents are female. This is extremely representative of the gender ratio in Tamil Nadu's (Where the research is based) engineering HEIs, with AnnaUnivCBE (2017) showing that 35% of engineering staff members are female. Comparing this nationally with all the different types of HEIs, AISHE (2017a) data shows that 40.6% of the academics are female. So, the research sample is pretty representative of gender differences even at the national scenario.

Regarding the position of the academics and the pay scale, there is no data available either at the national or state level to compare this sample data regarding its' representativeness. But in terms of the age group, from the researcher's experience, the sample data is reasonably representative, which predominantly has more young academics who are less than 35 years old and a fewer academics who are older than 45 years old. There was no correlation (p=0.098) between the age of the institutions and the age of the academics employed in them, showing that the distribution of the

academics age group is similar across the different institutions. In terms of frequency, respondents more than 45 years old and especially female academics more than 45 years old are under-represented in this data. It was not possible to conduct any statistically meaningful tests for these particular groups on their own, so a future research can focus on a purposive sampling based on gender representation for academics older than 45 years.

Overall, the sample can be empirically confirmed that it is representative of the population in terms of gender. It can be confirmed to be representative of the age group from the researcher's experience. When a national level or state level data base becomes available (Which the Government is currently working on), it will be possible to confirm the representativeness of the sample based on its other demographic characteristics. Until then, the limitation of this research's results based on the representativeness would be difficult to be measured empirically.

Step 5:

4.1.5 Tests of differences and association between demographic variables and Overall Research Productivity:

The second research question of this research is to identify which demographic variables and to what extent the different demographic variables affect RP of the engineering academics in Coimbatore. This section answers that research question.

In order to understand how the ORP varies between different demographic groups / levels and to know if there were any significant differences between the various levels (for instance, levels for gender are male and female), non-parametric tests of differences and association were conducted. Non-parametric tests were used, as the

Dependent Variable (DV) does not have a normal distribution (as seen from Table 21 and Fig 45. and Fig 46).

Appropriate non-parametric tests for the DV and Independent Variable (IV) were selected using Table 24, which provides a template for various tests based on the number of levels of the DV and IV.

Selection of the appropriate non-parametric tests for verifying association / correlation was done based on table 25 The equivalent of the parametric tests to that of the non-parametric tests used is seen from Table 26. To see if two variables are correlated with each other (not the levels as in Table 24, but the variables themselves), table 25 was used, table 27 was used to find how strongly the variables were correlated. To find how a change in one variable influences the other, tests of association/correlation are used.

Table 24: Non-parametric tests based on different types of DV and IVs:

	Independent variable					
	Tests of difference					**Tests of association**
	Single-Sample	**Related samples**		**Independent samples**		
		2 levels	**>2 levels**	**2 levels**	**>2 levels**	
Nominal DV	"Goodness of fit"	Mc Nemar,	Cochran's Q,	Fisher's (Need dichotomous) Chi Sq.	Chi Sq., Mantel-Haenszel	Phi, Cramer, Kappa
Ordinal (or) Interval DV	Kol.-Smir.	Sign, Wilcoxan signed rank test	Friedman	Median, M-W U test,	Median, K-W	Point biserial, Spearman's rho, Kendall's Tau

Source: Author based on Pett (2015), Everitt (1992) and Conover (1980).

Table 25: Tests of association between variables:

		Variable 2		
		Nominal	**Ordinal**	**Interval/Ratio**
Variable 1	Nominal	Phi (2 X 2) Cramer V (r X c) Kappa		
	Ordinal	Rank biserial	Spearman's rho Kendall's Tau	
	Interval/Ratio	Point biserial	Spearman's rho Kendall's Tau	Spearman's rho Kendall's Tau
r X c – any no. of levels between the two variables.				

Source: Author based on Pett (2015), Everitt (1992) and Conover (1980).

Table 26: Parametric and equivalent non-parametric tests:

Parametric tests	**Non-parametric equivalent tests**
1 sample t test	1 sample Wilcoxon
2 sample t test	Mann-Whitney test
One-way ANOVA	Kruskal-Wallis, Mood's median test
Pearson's correlation	Spearman's correlation

Source: Author.

Table 27: Correlation strength Table:

r^2	Strength of association:
0.81 - 1.00	Very strong
0.49 - 0.80	Strong
0.25 - 0.48	Moderate / Medium
0.09 - 0.24	Low
0.00 – 0.08	weak

Source Author, based on Forshaw (2007) and Miles and Shevlin (2001).

To identify the differences in ORP between different demographic levels, hypotheses and alternative hypothesis were formed and tested. This section looks at the demographic differences in the ORP. Also, pairwise comparison was done to see where the major differences lie.

Section 4.1.5 show the results from the various tests of association and differences between the various demographic and ORP.

4.1.5.1 Research productivity of Genders:

H1: There is no significant difference in the ORP between male and female

H1a: There is a significant difference in the ORP between male and female

Table 28: Distribution of ORP based on Gender:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.939	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Mann – Whitney U test (M-W test) in table 28 shows no difference between the ORP of males and females. The only difference found was based on the number of patents registered (p=0.008), but this cannot be given serious consideration as there were only eight patents registered in total.

4.1.5.2 Research productivity and the respondents' marital status:

Since none of the respondents had selected 'Do not wish to say / disclose' or 'Divorced / widowed', these levels were not considered in the analysis and no hypothesis were formed based on them.

H2: There is no significant difference between the RP of single and married lecturers.

H2a: There is a significant difference between the RP of single and married lecturers.

From table 29, the P (Sig.) value is less than 0.05, which means the alternate hypothesis is accepted and that there is a difference in the RP between single and married academics.

Table 29: Distribution of ORP based on the marital status:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Marital status.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The M-W U test shows that the mean rank of the RP of single academics is 127.55 and that of married academics is 174.22.

From the mean rank (See Fig. 48, Appendix 4) it can be seen that the married academics have an overall higher RP than single academics. However, this may be due to the age differences, *i.e., ORP increasing with the age and older academics (who might be married) might have already finished their PhD, thus increasing their ORP.*

4.1.5.3 Research productivity of age group:

H3: There is no significant difference between the ORP of various age groups.

H3a: There is a significant difference between the ORP of various age groups.

Table 30: Distribution of ORP based on the age group:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Age group in years.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

From Table 30, the Kruskal – Wallis H (K-W-H) test shows that there are differences in terms of the ORP of academics of different age groups. The differences in the mean rank of the ORP of academics can be seen in Fig.22.

Fig.22 shows that the ORP of academics increases with increasing age until the first three levels. The ORP score then slows down (in mean ORP) or it decreases slightly (in Median ORP) between 35-45years and 45-55years. It should be noted that there are only 4 respondents who are more than 55 years old or more.

In order to test the level of association/correlation between ORP and the age group (ordinal level variable), both Kendall's Ƭ and Spearman's ρ were used (See Table 31).

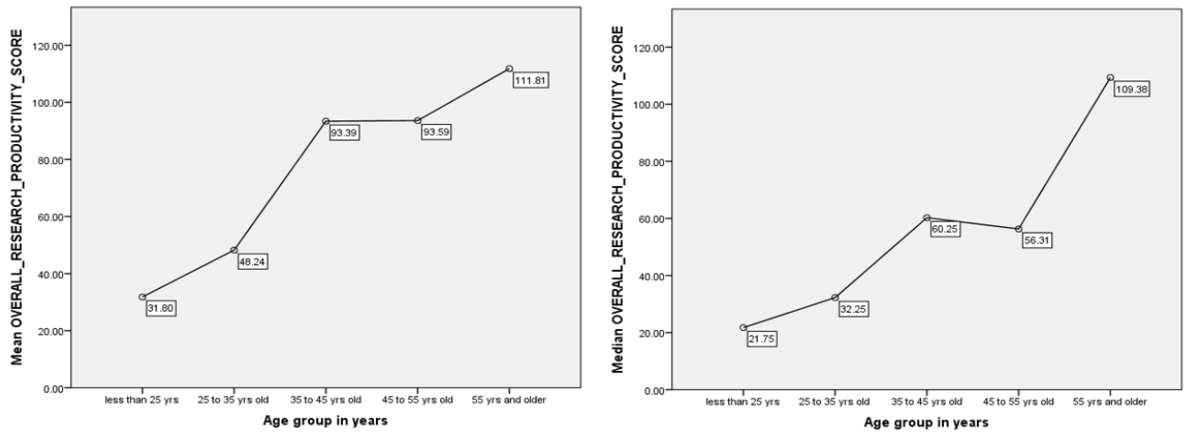
Kendall's Ƭ shows that there is a low to moderate positive correlation of 0.225 (P= 0.01) between the age groups and ORP. So, as the age increases, the ORP also increases. Spearman's ρ reflects the above results showing a low to moderate positive correlation of 0.307 (P= 0.01) between the age groups and ORP.

Table 31: Non-parametric correlations between ORP and age groups:

Correlations				
			Age group in years	ORP
Kendall's tau_b	Age group in years	Correlation Coefficient	1.000	.225**
		Sig. (2-tailed)	.	.000
		N	307	307
	ORP	Correlation Coefficient	.225**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
Spearman's rho	Age group in years	Correlation Coefficient	1.000	.286**
		Sig. (2-tailed)	.	.000
		N	307	307
	ORP	Correlation Coefficient	.286**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
**. Correlation is significant at the 0.01 level (2-tailed).				

Post hoc test analysis using Dunn's pairwise comparison method (Dunn, 1964) with Bonferroni correction for multiple comparisons is shown in Fig.49 (Appendix 4). The mean rank shows there is difference in the ORP between '<25 years. (117.66) and 35-45years old (203.09)', between '<25 years' (117.66) and 55 years+ (257.62)' and between '25-35 years (146.26) and 35-45years old (203.09)'.

Fig.22: Mean and median distribution of ORP based on the age group:



4.1.5.4 Research productivity of types of institutions:

H4: There is no significant difference between the RP of the types of institutions.

H4a: There is a significant difference between the RP of the types of institutions.

Table 32: Distribution of ORP based on the type of institution:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Type of the institution.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The K-W-H test with a (Chi Square) with 2 degrees of freedom expressed in bracket χ^2 (2) = 18.98 shows a significance (P-value) of less than 0.05 (Table 32.). This shows that there is a difference in the RP between the types of institutions.

Since the types of institutions is a nominal variable, no tests of association have been used. Post hoc test analysis (Fig.50) shows a significant difference in the RP between 'Affiliated (137.12) and Autonomous (175.44); and between the Affiliated (137.12) and Deemed Universities (195.45). It also shows that the Deemed Universities have a higher mean rank (195.45) than the Autonomous (175.44) and the affiliated institutions (137.12). The mean time spent by the academics in different types of institutions is shown in Fig.51 (Appendix 4).

4.1.5.5 Research productivity vs. age of the institutions:

H5: There is no significant difference between the RP and the age of the institutions.

H5a: There is a significant difference between the RP and the age of the institutions.

Table 33: Distribution of ORP based on the age of the institution:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Age of the institution.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

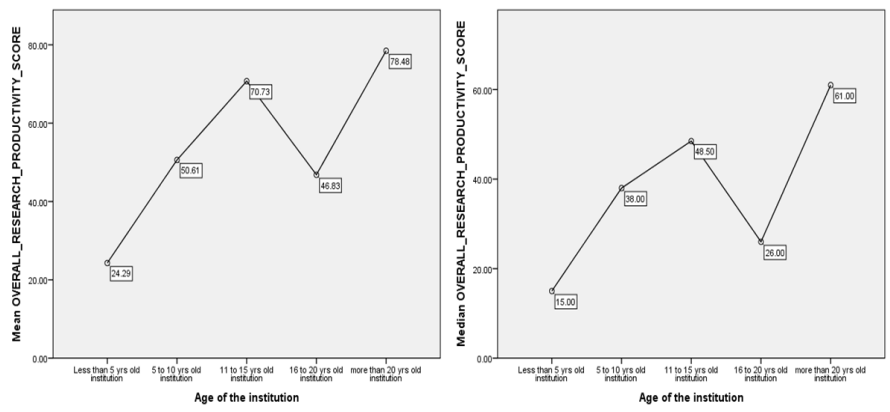
Asymptotic significances are displayed. The significance level is .05.

Based on the K-W test (Table 33), the alternate hypothesis is accepted. Fig.52 shows the post-hoc pairwise comparison to see where the differences lie. There is a difference in the mean rank between <5 years. (94.14) and 5 to 10 years (151.21), 11 to 15 years (177.65) and >20 years old (203.70).

Similarly, there is a difference in the mean rank between ’16 to 20-year-old institutions (135.16) and ‘> 20 yr. old institutions (203.70)’.

The mean and median graph (Fig.23) shows the ORP steadily increasing with the age of the institution but falling for institutions which are 16 to 20 years old, after that it increases. This suggests that the new institutions are more focussed on teaching than research.

Fig.23: Age of the institution and the mean, median of ORP:



Kendall's Ƭ test shows that there is a low positive correlation of 0.138 (P= 0.01) between the age groups of the institutions and Overall RP (See table 67, see appendix 5). Therefore, as the age of the institutions increase the RP also increases. Spearman's ρ reflects the above results showing a low positive correlation of 0.186 (P= 0.01) between the institute's age groups and ORP.

To understand if the % of time spent on research varied between the types of institutions, a mean % graph was plotted (Fig. 53, see appendix 4) which reflects the mean and the median graph.

4.1.5.6 Research productivity in terms of the position in the institutions:

H6: There is no significant difference between the RP of the academics' position in the institutions.

H6a: There is a significant difference between the RP the academics' position in the institutions.

Table 34: Distribution of ORP based on the position in the institution

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Position in the institution.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Levels labelled 'Others' and 'Principal' were not considered for analysis, as no principal answered the questionnaire and there were only 2 respondents for the 'Other'

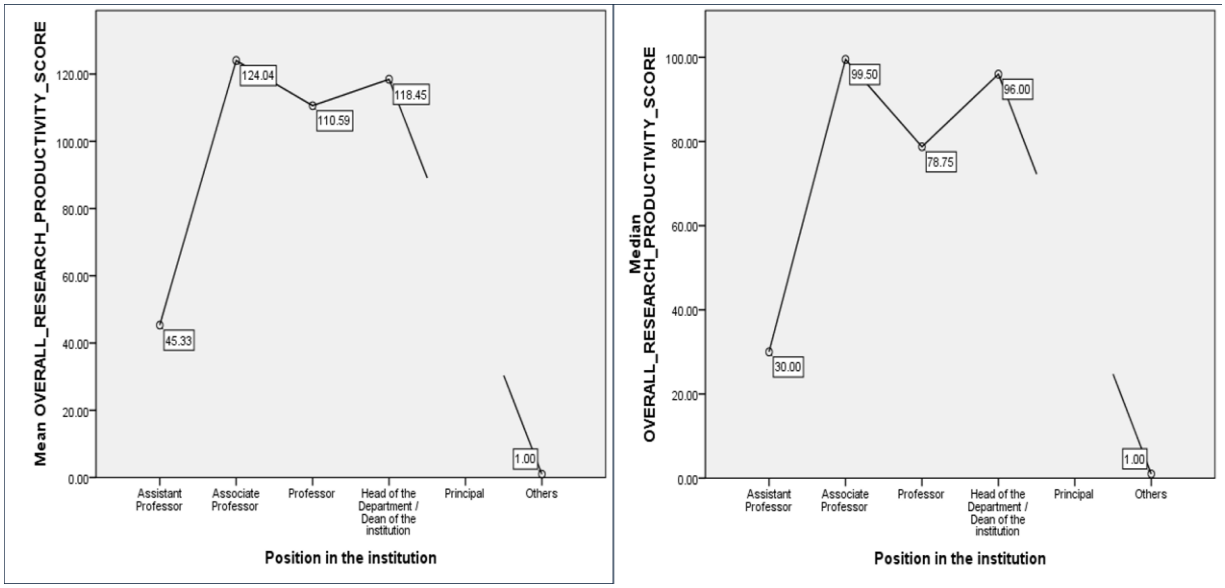
section. Table 34 shows that there is a difference in the ORP of the academics in different positions.

The mean and the median graph (Fig.24) shows that Associate Professors have higher RP than the other categories. The data shows a dip in the RP after ‘Associate Professor’.

Another interesting result is the increase in ORP by 273% from Assistant Professor to Associate Professor after which there is no substantial difference.

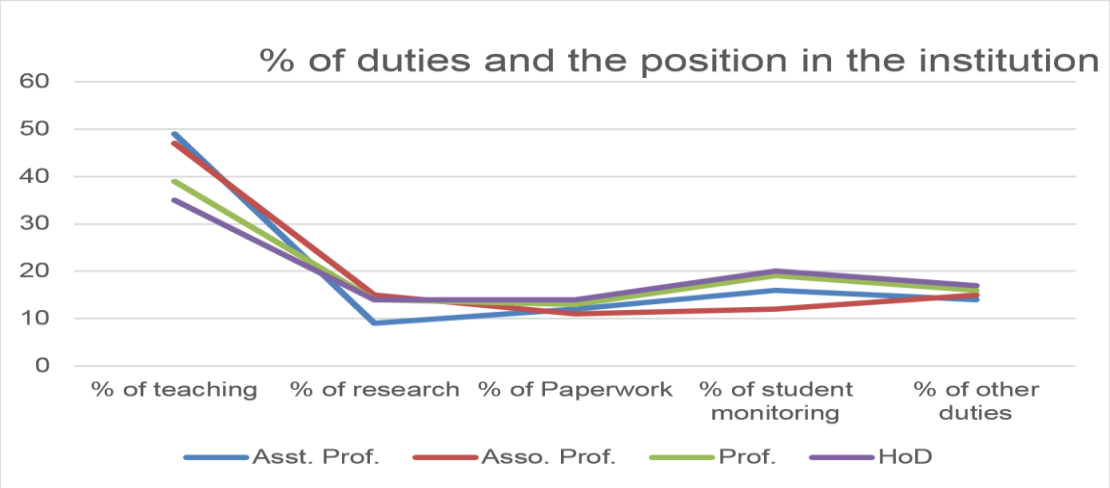
Since ‘Academic’s positions in the institution’ is a nominal variable, no tests of association have been done.

Fig.24: Mean and Median of ORP based on the position in the institution:



A plot of the % of duties of academics in different positions in the institution (Fig.25) does not show any stark differences in the % of research conducted by different positions, especially between Assistant and Associate Professors, yet from Fig. 24, there is a huge difference in their ORP.

Fig.25: Percentage of duties based on the position in the institution:



4.1.5.7 Research productivity of the departments:

H7: There is no significant difference between the RP of different departments.

H7a: There is a significant difference between the RP of different departments.

Table 35: Distribution of ORP based on the different departments:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Department.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Even though the K-W test shows significant differences in ORP between the departments (Table 35), pairwise comparison showed no differences in the ORP of the departments. Textile Engineering (n=3), Automotive Engineering (n=3), Aeronautical Engineering (n=1), Biotechnology (n=3), Chemical Engineering (n=1)

and Food Processing Engineering (n=2) departments were omitted as they have very few respondents as shown in the brackets.

No inferential statistic test was done for the same reason. Since 'Department' is a nominal variable, no tests of association have been done.

4.1.5.8 Research productivity of academics with different years of experience:

H8: There is no significant difference between the RP of academics with different years of experience.

H8a: There is a significant difference between the RP of academics with different years of experience.

Table 36: Distribution of ORP based on the Teaching experience:

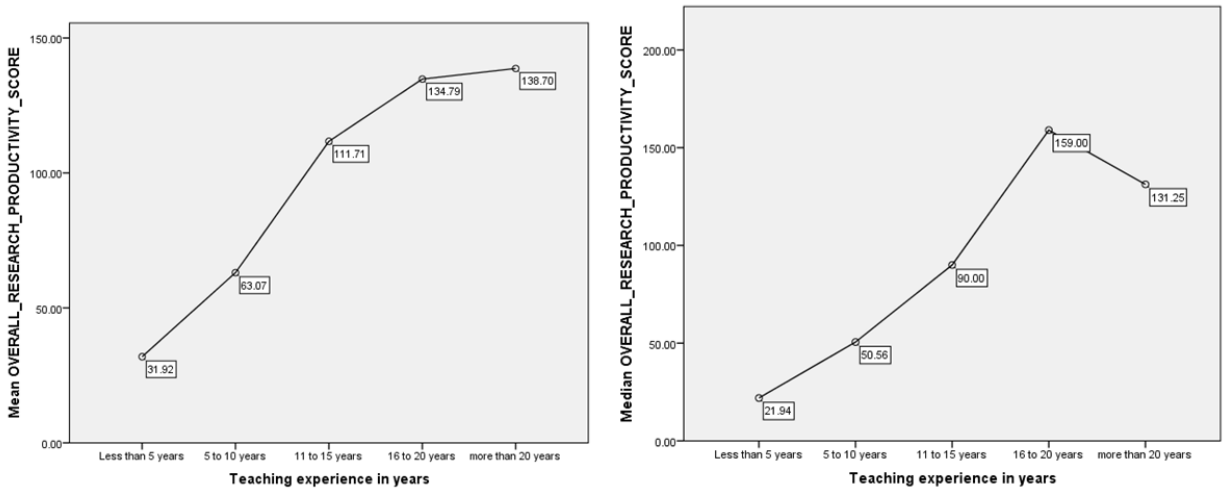
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Teaching experience in years.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

K-W test shows a difference in the RP of academics with differing experience (Table 36). The median curve (Fig.26) shows that the RP increases steadily as the years of teaching experience increases and it reaches a maximum of 159 for 16 to 20 years and then it drops down to 131.25. Teaching experience was positively correlated with the pay grade (0.661**), see table 64.

Fig.26: Teaching experience and the mean, median of ORP:



However, it has to be noted that there are only 9 respondents for 16 to 20 and only 5 in more than 20 years. If the levels ‘16 to 20 years’ and ‘more than 20 years’ are removed, the RP curve shows a gradual increase with respect to the number of years of experience.

Kendall's Ƭ test (See table 68 in appendix 5) shows that there is a medium positive correlation of 0.394 (P= 0.01) between the teaching experience in years and ORP. Therefore, as the experience increase, the RP also increases. Spearman’s ρ reflects the above results showing a medium positive correlation of 0.496 (P= 0.01) between them.

4.1.5.9 Research productivity of academics with different pay grades:

H9: There is no significant difference between the RP of academics with different pay grades

H9a: There is a significant difference between the RP of academics with different pay grades

The alternate hypothesis was accepted (Table 37). The graph (Fig.27) shows that the RP increases with the pay grade and then decreases slightly from '35 to 45K / month' to the '55 to 65K / month' whereas the RP increases rapidly for academics with a salary of more than 65K/month. Usually they would be senior academics who would be guiding PhD students and so might have their names on their students' papers.

Table 37: Distribution of ORP based on the Teaching experience:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Pay grade in Rupees/month.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Post hoc pairwise comparison test (Fig. 54, see appendix 4) shows the difference between the mean rank of ORP between '<25K / month' (110.97) and all the other pay grades. Similarly, there is a difference between the mean rank of '25-35K / month' (160.11) and that of '35-45K / month' (240.80) and that of '>65K / month' (258.68). Kendall's Ƭ test (See table 69, see appendix 5) shows that there is a medium positive correlation of 0.387 (P= 0.01) between the pay grade and ORP. Therefore, as the pay grade increases, so does the RP. Spearman's ρ reflects the above results showing a medium positive correlation of 0.502 (P= 0.01) between them.

Fig.27: Mean distribution of ORP based on the academics' pay grade:

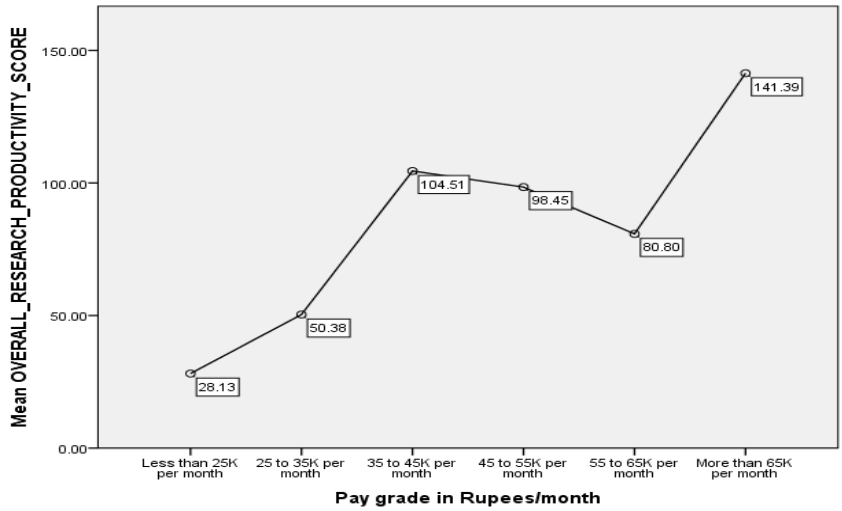


Table 38 shows that in general, as academics become more senior, their pay grade also increases. However, there are a few anomalies – as 18 Assistant Professors earn more than 65K/ month and two of the Head of the department / dean earns between 35 – 45K / month.

Table 38: Cross tabulation of pay grade and the position in the institution:

Pay grade in Rupees/month * Position in the institution Crosstabulation							
Count							
		Position in the institution					
		Assistant Professor	Associate Professor	Professor	Head of the Department / Dean of the institution	Others	Total
Pay grade in Rupees/month	Less than 25K per month	112	2	0	0	2	116
	25 to 35K per month	112	5	0	0	0	117
	35 to 45K per month	14	9	1	2	0	26
	45 to 55K per month	6	1	2	1	0	10
	55 to 65K per month	18	2	0	2	0	22
	More than 65K per month	2	4	4	6	0	16
Total		264	23	7	11	2	307

4.1.5.10 Research productivity of academics with industrial experience:

H10: There is no significant difference between the RP of academics with industrial experience

H10a: There is a significant difference between the RP of academics with industrial experience

Table 39: Distribution of ORP based on the industrial experience:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Industrial experience.	Independent-Samples Mann-Whitney U Test	.432	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Both the M-W U test and a two sample K-S test gives a P value of 1, much higher than 0.05, so null hypothesis is accepted (Table 39).

4.1.5.11 RP of academics with degrees abroad:

H11: There is no significant difference between the RP of academics with degrees abroad

H11a: There is a significant difference between the RP of academics with degrees abroad

None of the respondents had degrees earned abroad, all were studied in India. So, no tests were conducted.

4.1.5.12 RP of academics with different degrees:

H12: The overall RP of academics with different degrees are the same.

H12a: The overall RP of academics with different degrees are the not the same.

Table 40: Distribution of ORP based on the degrees achieved (Source: author)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Overall Research Productivity (RP) is the same across categories of Degrees achieved.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

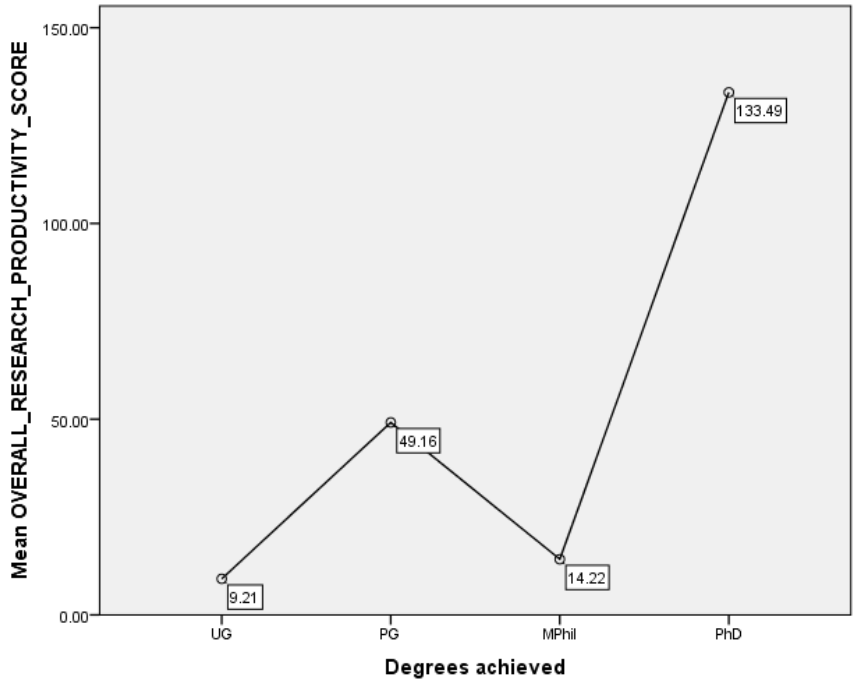
Asymptotic significances are displayed. The significance level is .05.

Both K-W and Jonckheere-Terpstra (J-T) tests show significant differences in the RP of academics with differing academic qualifications (Table 40).

Dunn's pairwise comparison with Bonferroni correction chart (Fig. 55, see appendix 4) Shows that the ORP of those with a PhD is much higher than that of the academics with just a PG, or MPhil (Fig.28).

However, it should be noted that the number of respondents for both UG (n = 7) and MPhil (n = 9) are much lower than the no. of respondents who have PG (n = 272) and PhD (n = 36).

Fig.28: Distribution of ORP based on the degrees achieved



Dunn's Post hoc pairwise comparison test shows a significant difference ($p<0.001$) in the mean rank of having achieved PG (149.11) and PhD (253.54).

4.1.5.13 RP of academics working towards different degrees:

H13: The overall RP of academics working towards different degrees are the same.

H13a: The overall RP of academics working towards different degrees are the not the same.

K-W test showed that there is a significant difference between the groups (Table 41). The test also showed that there was no significant difference in the RP between the academics pursuing their PG or those pursuing their PhD ($P = 0.064$), but there was a difference in the ORP of those who have chosen Not applicable and Pursuing PhD (Fig.29.A full comparison is seen in Fig.56, see appendix 4).

Since the difference was between those who responded 'Not applicable' and pursuing PhD, no post hoc tests were conducted.

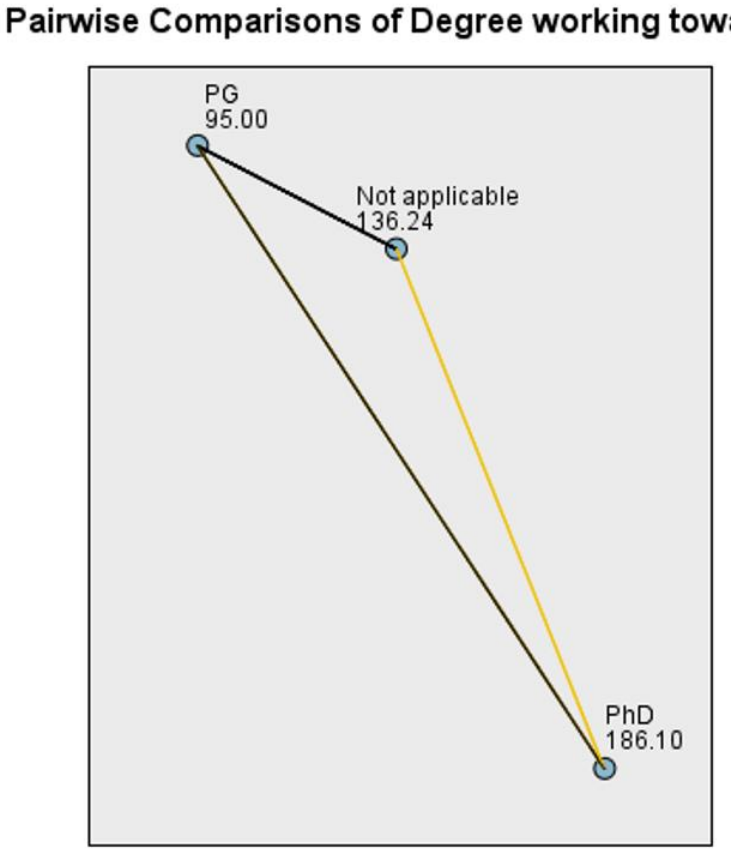
Table 41: Distribution of ORP based on the degrees working towards:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_ PRODUCTIVITY_SCORE is the same across categories of Degree working towards.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Fig.29: Pairwise comparison of Degree working towards:



4.1.5.14 RP of academics with different working hours per day:

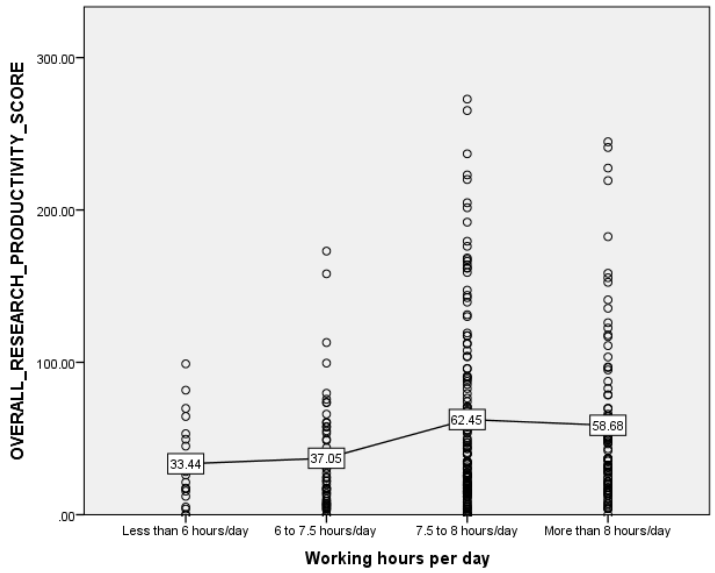
H14: The overall RP is the same across categories of working hours/day

H14a: The overall RP is not the same across categories of working hours/day

K-W test showed that there was no significant difference in the RP between academics with different hours of working/day. The distribution of the working hours per day is shown in Fig. 30.

Kendall's Ƭ test (See table 70 in appendix 5) shows a very low positive correlation of 0.117 (P= 0.01) between working hours/day and ORP. Therefore, as the working hours increase, so does the ORP. Spearman's ρ reflects the above results showing a very low positive correlation of 0.154 (P= 0.01) between them. It would have been more interesting to know if time for research is included in this or not.

Fig.30: Distribution of ORP based on the working hours/day:



4.1.5.15 RP of academics with different teaching hours per week:

H15: The overall RP is the same across categories of teaching related hours/week

H15a: The overall RP is not the same across categories of teaching related hours/week

Table 42: Distribution of ORP based on the teaching related hours / week:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_ PRODUCTIVITY_SCORE is the same across categories of Teaching related hours per week.	Independent-Samples Kruskal-Wallis Test	.051	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table 42 shows that there is no significant difference (p=0.063) in the RP of academics and the teaching related hours / week.

4.1.5.16 RP of academics with different residency from campus:

H16: The overall RP is the same across categories of residency from the campus

H16a: The overall RP is not the same across categories of residency from the campus

Table 43: Distribution of ORP based on the residency from the campus

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Residency from the campus.	Independent-Samples Kruskal-Wallis Test	.176	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

There is no difference between the academics' residing distance from the campus and their RP (Table 43).

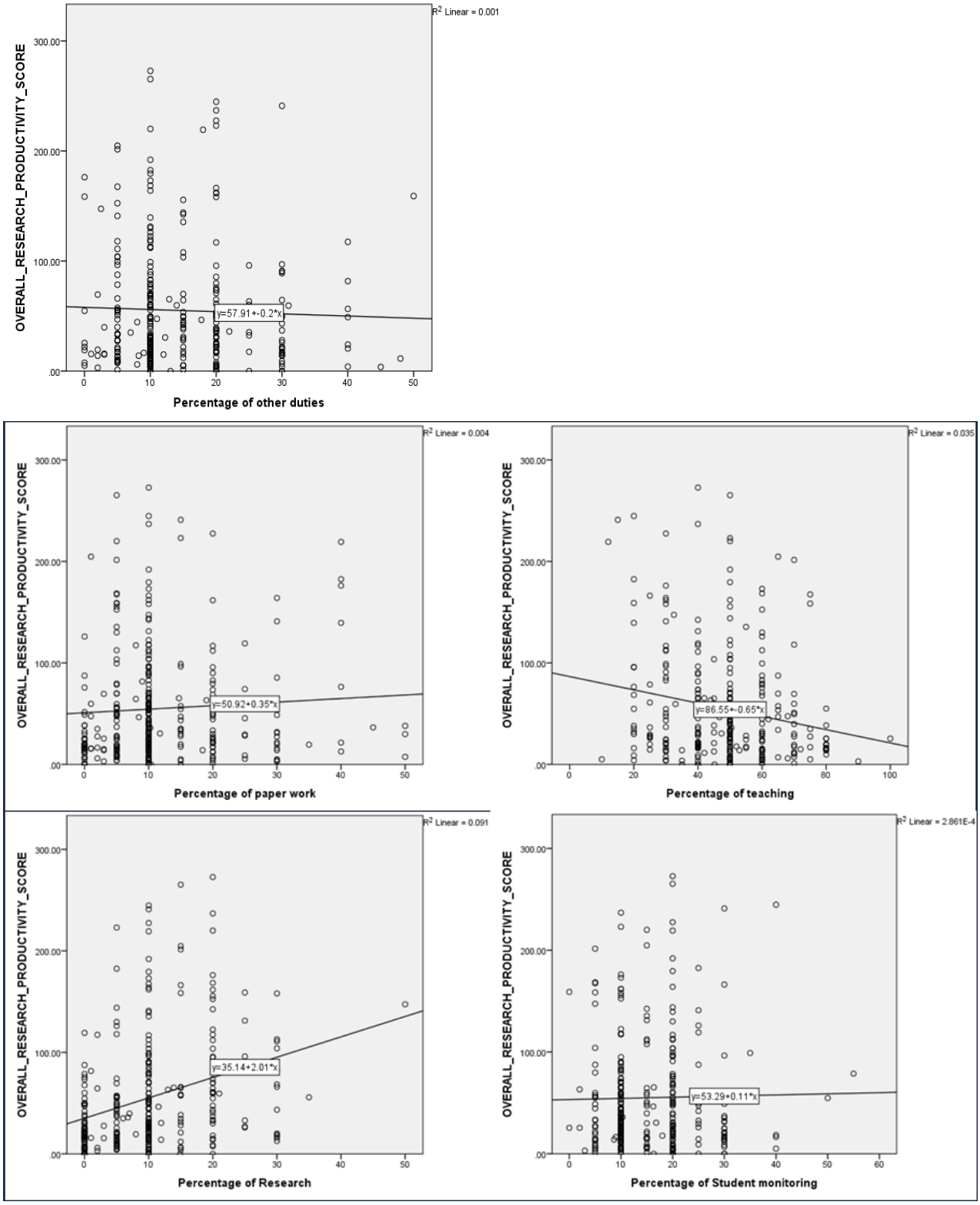
4.1.5.17 OPR based on the % of duties:

It is clear that the ORP decreases as the percentage of teaching increases as the academic is spending less time conducting research (Fig.31). As the percentage of research conducted by the academics increases, their ORP increases. The other three variables have much less impact on the academics' ORP.

The correlation for each of the work-related activities and their ORP were calculated. The correlation tests (See Table 23, see appendix 5) show that the percentage of teaching has a low negative correlation with the ORP and the percentage of research

has a low positive correlation with ORP. The percentage of paperwork, student monitoring and other duties are not correlated with ORP.

Fig.31: ORP based on the % of duties:



Step 6:

4.1.6 Exploratory Factor analysis (EFA):

Research question 1 of this research is to identify and measure the various factors that influence the RP of the academics in Coimbatore's engineering institutions. This section along with section 7 will answer this research question.

The following section describes why and how a Principle Component Analysis (PCA) was conducted and how the latent variables based on the inter-correlations of the variables were identified.

4.1.6.1 Theoretical underpinning:

The questionnaire was designed based on the various elements that were found to be important from the interviews and literature. The questions were divided into the following groups based on the conceptual model:

1. Personal,
2. Professional,
3. Organisational,
4. Changing academic environment,
5. Governing / external bodies and
6. Indigenous factors.

After data collection, the dataset was used to form latent or unobserved variables (LV) that would alter the conceptual model. PCA is an iterative form of EFA (Child, 2006) that is used for reducing the number of variables and to identify LV.

PCA was conducted for the following reasons:

1. Reduce the redundancy in the number of variables.
2. Remove unrelated variables,
3. Remove multi-collinearity,
4. Organise the independent variables into fewer factors / components based on the correlations between the independent variables (Hinton et al., 2014, Yong and Pearce, 2013, Fabrigar and Wegener, 2011).

EFA does not only offer a clearer view of the data, but also the output can be saved as regression scores for further analysis (Kootstra, 2004, Field, 2009)

4.1.6.2 Steps in conducting PCA:

A step by step method of conducting PCA is given in Fig.32. As a first step, all the variables were used for conducting PCA. Field (2009) recommends that the ratio between the numbers of respondents to the number of variables should be at least 5:1 for PCM to be meaningful.

In this analysis, the ratio is 307 respondents / 45 variables = 6.8:1, higher than the suggested value. In order to test the sampling adequacy, a Kaiser-Meyer-Olkin (KMO) test was conducted.

KMO gave a sampling adequacy of 0.761 (Table 44). An adequacy value of more than 0.5 is considered good (Hinton et al., 2014) as is a Bartlett's significance value less than 0.05.

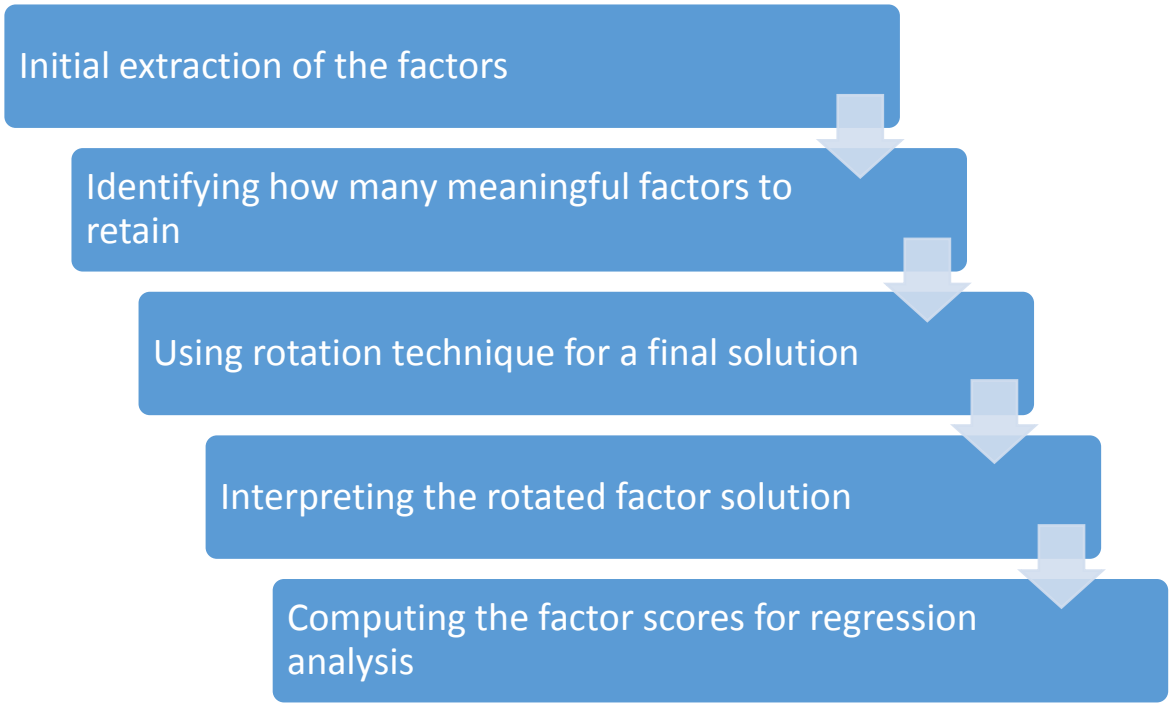
In order to check multi-collinearity Bartlett's Test of Sphericity was conducted, giving a value of less than 0.005, showing no multi-collinearity.

Table 44: Kaiser-Meyer-Olkin and Bartlett's Test for sampling adequacy:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.761
Bartlett's Test of Sphericity	Approx. Chi-Square	3876.159
	df	990
	Sig.	.000

The six steps as mentioned in Fig. 25 was used to conduct PCA.

Fig.32: Flow chart of PCA:



Source: Author

4.1.6.2.1 Checking for reliability:

Initially, the reliability of the section 2 of the questionnaire was checked by calculating the reliability coefficient (Cronbach's alpha) as shown in table 45. The overall Cronbach's alpha value is 0.779, which is considered good (Hinton et al., 2014).

Table 45: Reliability statistics of section 2 used for EFA:

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.779	.784	45

4.1.6.4 The initial criteria used for PCA:

1. Rotation: Varimax,
2. Factor extraction: Eigen values greater than 1,

The Correlation matrix (too big to include in the thesis) was studied for inter-correlations between the variables. The correlation matrix was used to reduce the number of variables by finding the variables that correlate highly with one group of variables rather than the other groups. It was also used for identifying those variables that do not correlate with any other variables, meaning that those non-correlating variables are measuring something completely different (Field, 2009, Williams et al., 2010).

4.1.6.5 Eliminating variables to create a simple model:

From the correlation matrix, the following components showed less than 0.3 correlations with the other factors, and so were eliminated from the analysis (Green and Salkind, 2010). When the correlation of a variable with that of other variables is less than 0.3, it means that the variable is measuring something different compared to the other variables. If the variables show very high correlation, then they might be measuring the same construct and results in multi-collinearity.

Variables with less than 0.3 correlations with any of the other 45 variables:

1. I enjoy simple and straightforward tasks more than the challenging ones (Max Cor. 0.295)
2. I prefer to teach rather to conduct research (Max Cor. 0.295)
3. I doubt if I will ever be able to conduct high quality research (Max Cor. 0.261)
4. In general, I am strongly motivated by the money I can earn(Max Cor. 0.218)
5. I will not waste time conducting research – if it does not lead to promotion (Max Cor. 0.261)
6. As long as I get my PhD, promotion, or better opportunity; I don't really care if people use my research or not (Max Cor. 0.288)
7. There is a shortage in the number of guides / supervisors for conducting PhD and further research (Max Cor. 0.243)
8. The psychological satisfaction I get out of research motivates me more than the monitory/materialistic rewards it can bring (Max Cor. 0.285)
9. I consider 'Auspicious time', 'Astrology' and/or 'Vaastu Saastram' (Architectural codes) to be of importance while making decisions about the research (Max Cor. 0.288)

Even though variables 1 and 2 were very close to 0.3, in the subsequent iterations, they showed a maximum correlation of 0.23 and 0.25 with other factors, so were deleted.

After deleting the above nine variables, all the remaining variables showed a correlation of more than 0.3 with at least one other variable. Also, the Measure of Sampling Adequacy (MSA) was used to check for any variables showing a value of less than 0.6, all the variables showed an MSA of more than 0.6, so no variables were deleted based on MSA.

4.1.6.6 Iterations for PCA:

After deleting the nine variables, PCM was re-iterated. Factors with an Eigen value of more than 1 (Keiser criteria) were retained and the following results were obtained:

Table 46: Kaiser-Meyer-Olkin and Bartlett's Test for sampling adequacy after deleting nine variables:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.783
Bartlett's Test of Sphericity	**Approx. Chi-Square**	3073.894
	df	630
	Sig.	.000

KMO test (See table 46) shows a sampling adequacy of 0.783 and Bartlett's test is significant. From the Total Variance Explained Table (See table 72 in appendix 5) SPSS suggested 11 factors by Kaiser Criteria of Eigen values more than 1. The total variance of 61.21%, which is higher than the often recommended 40% as a rule of thumb (Blunch, 2012).

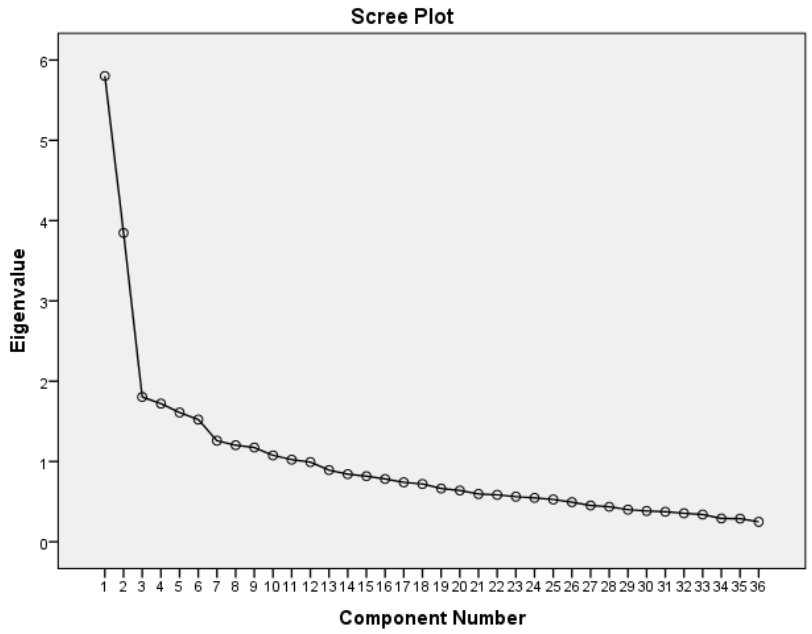
The Scree plot (Fig. 33) shows the elbow region after the fifth factor – even though 11 factors are above Eigen value of 1.

Even though the Eigen values were more than 1 for 11 factors, after the fifth factor, the Eigen values are close to one. Also Blunch (2012), Field (2009) and Miller Jr (1997) comment:

1. There is no hard and fast rule to decide how many factors can be extracted.

2. The ‘scree plot’, ‘total variance explained’ and the ‘Eigen values’ are to be used as guidance and the decision of the number of factors to be extracted completely depends on the researcher.
3. The number of factors should be based on if the model is meaningful and if it can be theoretically justified – based on the rotated component matrix.

Fig.33: Scree plot for the number of factors:



So, a seven-factor model was executed in SPSS (Total variance explained – 48.78%). However, the rotated component matrix did not give any meaning for the seventh factor. The variables in the seventh factor gave a complex model (i.e., the variables loaded highly on two or more factors). So, a six-factor model was executed in SPSS (KMO – 0.783 and Total variance explained – 45.287%). This gave a simple model.

For the extraction of LV, the criteria applied were:

a. Type of rotation: Varimax
b. Co-efficients of absolute value below 0.4 were supressed.

With the 6-factor model and during further iterations, the following variables along with the already deleted 9 variables) were deleted and the reasons for deleting them are given.

1. “There is a lack of public expenditure on research” - did not load on any factor.
2. “Delays in research process are inevitable and acceptable” - did not load on any factor.
3. “There are too few industry-academia links” loaded on F1, - but did not fit in with the other variables, so deleted, as it did not give any meaning to the factor.
4. “More than my own abilities, it is because of God’s grace that I have achieved so far” - had a low loading of 0.371 in F3. Also re-introducing the variable reduced the percentage of variance explained.
5. “The colleges are becoming more and more into a money-making machine” - loaded 0.529 in F1 and 0.467 in F2, giving a complex model.
6. “The library and the lab facilities in the college are adequate for me to conduct research” - was deleted as it brought down the Cronbach’s alpha reliability. The Cronbach’s alpha reliability of the model increased from 0.709 to 0.732 after deleting it.

Further iterations were attempted in which the deleted variables were re-introduced one by one and in different combinations, but they either resulted in a complex model, and/or did not load on any factors and they decreased the percentage of variance explained. Overall, 15 variables were deleted. A separate analysis is conducted with the deleted variables in sec.4.1.9 as ‘Step 9’.

4.1.6.7 PCA results:

After deleting the 15 variables, KMO and Bartlett's Test was conducted which showed a better sampling adequacy of 0.773 (Table 47) and the total variance explained increased to 48.50 % for a 6 factor model (Table 49). The model exhibited a simple structure with each variable loading only in one factor.

Table 47: Kaiser-Meyer-Olkin and Bartlett's Test for sampling adequacy final EFA model:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.773
Bartlett's Test of Sphericity	**Approx. Chi-Square**	2289.223
	df	435
	Sig.	.000

Source: Author.

After deleting the above 15 variables, Cronbach's alpha was calculated (Table 48), which even though has reduced from 0.779 to 0.737, is still within the 'Good' range.

Table 48: Reliability Statistics for the final EFA model:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.732	.737	30

Source: Author.

Table 49: Total Variance Explained for the final EFA model:

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.696	15.654	15.654	4.696	15.654	15.654	2.796	9.320	9.320
2	3.589	11.963	27.617	3.589	11.963	27.617	2.740	9.134	18.454
3	1.727	5.755	33.372	1.727	5.755	33.372	2.548	8.492	26.946
4	1.612	5.375	38.747	1.612	5.375	38.747	2.377	7.923	34.869
5	1.473	4.910	43.657	1.473	4.910	43.657	2.187	7.290	42.159
6	1.453	4.844	48.501	1.453	4.844	48.501	1.903	6.342	48.501
7	1.184	3.945	52.446						
8	1.054	3.514	55.960						
9	1.016	3.387	59.347						
10	.983	3.276	62.624						
11	.919	3.062	65.686						
12	.866	2.886	68.572						
13	.775	2.582	71.154						
14	.732	2.440	73.594						
15	.708	2.361	75.955						
16	.678	2.259	78.214						
17	.647	2.157	80.371						
18	.631	2.104	82.475						
19	.602	2.005	84.480						
20	.544	1.813	86.293						
21	.531	1.769	88.062						
22	.499	1.663	89.724						
23	.467	1.558	91.282						
24	.446	1.487	92.769						
25	.412	1.374	94.143						
26	.396	1.320	95.463						
27	.387	1.289	96.752						
28	.353	1.177	97.928						
29	.328	1.095	99.023						
30	.293	.977	100.000						
Extraction Method: Principal Component Analysis.									

Source: Author.

During PCA, each of the above six factors (F1 to F6) (Table 49) were saved as a separate factor based regression scores. The regression scores are composite scores which are a combination of the scores of the variables that loaded highly on a particular factor. These scores provide information on the respondent's factor placement

(DiStefano et al., 2009) and allow for regression analysis to be conducted between the DV, IVs and the factor scores generated for the identified LVs.

Table 50: Final rotated component matrix with all co-efficient:

		Rotated Component Matrix[a]						
No	F		Component					
			1	2	3	4	5	6
1	F1.1	There has been a significant increase in the workload for the faculty	**.740**	.136	.126	-.135	.057	.103
2	F1.2	The quality of the students entering engineering colleges has dropped noticeably	**.605**	.229	-.146	.051	.080	.177
3	F1.3	Faculties have to undertake more and more administrative (Paperwork) duties these days	**.600**	.296	.084	-.098	.053	-.072
4	F1.4	Academia is becoming a less attractive career.	**.582**	.302	-.188	.055	-.037	.203
5	F1.5	My teaching workload prevents me from conducting research	**.564**	-.250	.272	-.166	-.071	-.068
6	F1.6	The colleges are more focussed on student results -negatively impacting on the faculty's research	**.520**	.073	.064	-.338	-.029	.294
7	F2.1	There are a some engineering colleges in Coimbatore which should not have been accredited at all	-.061	**.659**	.102	-.071	.125	.039
8	F2.2	The checks to counteract the malpractices in the colleges are largely ineffective	.076	**.659**	.077	-.153	-.011	.095
9	F2.3	Corruption has found its way into academic research	.282	**.654**	-.025	.025	.002	-.056
10	F2.4	Unfortunately it is becoming common that academics are buying research work rather to conducting it themselves	.364	**.594**	-.025	.115	.079	.072
11	F2.5	The colleges are less driven by social and moral responsibilities	.318	**.559**	-.060	-.206	-.055	.257
12	F2.6	The governing bodies have less concern about the quality of research from the Affiliated colleges	.049	**.531**	.192	-.180	.020	-.013
13	F3.1	I am motivated by the belief that conducting research will earn me divine merit (Punniyam) for my next life.	-.098	-.038	**.757**	.093	-.013	.150
14	F3.2	I consider it is my moral duty (Dharma) to conduct research.	.093	.041	**.739**	.127	.109	-.073
15	F3.3	Being of service to others/ use to the society is the prime motivator for me to conduct research	.055	.097	**.678**	.156	.227	-.085
16	F3.4	To me, being in academia to teach and to conduct research is a God given duty/destiny	-.095	.161	**.517**	.265	.184	.002
17	F3.5	Being a role model to the society/others is very important for me	.097	.070	**.500**	.074	.078	.141
18	F4.1	I am stimulated by the research works. of my colleagues	.035	-.069	.075	**.677**	-.120	-.028
19	F4.2	In general, I am strongly motivated by the recognition I get from other people	.091	-.074	.138	**.581**	.134	-.106
20	F4.3	My job is secure enough for me to focus on research	-.241	-.049	.214	**.580**	.111	.103

21	F4.4	The college encourages and cares about the faculty's research works (Financially and morally)	-.199	-.227	.104	**.570**	.048	-.145
22	F4.5	My colleagues and I regularly discuss about each other's research topics	-.177	-.050	.159	**.536**	.156	-.028
23	F5.1	It is important that I have a real interest in the research I am carrying out.	.000	.003	.068	.147	**.762**	-.025
24	F5.2	Conducting research activities is very enjoyable for me	-.041	.046	.083	-.067	**.753**	.083
25	F5.3	I am conducting research so that my career will progress to the next level	.063	.036	-.025	.312	**.527**	-.045
26	F5.4	I am confident in my skills of using research tools and software	.012	.062	.176	.113	**.518**	.038
27	F5.5	Curiosity is the driving force behind me conducting research	.065	-.005	.256	-.248	**.494**	-.099
28	F6.1	I receive no / little support for attending FDPs (Faculty Development Programmes) to improve my research skills	.058	.006	.038	-.123	.101	**.770**
29	F6.2	I receive no / little on-duty facility or flexible teaching hours to support my research activities	.068	.019	.127	-.008	-.006	**.761**
30	F6.3	The colleges in general lack vision for the lecturers' development and their research	.272	.248	-.044	-.052	-.133	**.589**
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.								
a. Rotation converged in 9 iterations.								

Source: Author.

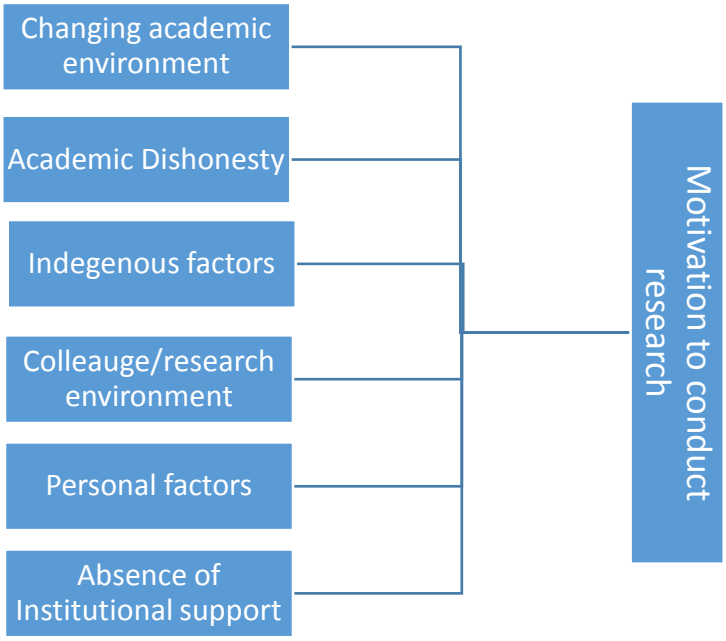
The final rotated component matrix is shown in table 50 and the factors were renamed to better reflect the components in them. The renamed factors are seen in table 51.

Table 51: Renaming the factors:

No.	Factor
1	Changing academic environment
2	Academic dishonesty
3	Indigenous factors
4	Colleague/research environment
5	Personal factors
6	Absence of institutional Support

Source: Author.

Fig.34: Factors influencing the RP of the academics:



Step 7:

4.1.7 Regression analysis:

In this step, research question 1 of this research will be answered, as a continuation from step 6. In this step, both the demographics and the six factors identified in step 6 will be used to answer research question 1.

Regression is conducted in this research for the following reasons:

1. To determine the value of ORP (DV) given multiple IVs and

2. To identify the various demographic variables that might be significant in increasing the ORP and the elements of ORP.

It is important to choose the specific type of regression that suits the type of data (See Table 52). The analysis should be chosen based on the type of DV, power of DV, IV, number of IVs, multicollinearity and heteroscedasticity (Field, 2009).

For regression analysis there is no need for the DV to be normally distributed (Miles and Shevlin, 2001), so no transformations were done even though the ORP was skewed (See Fig.45 and 46 in appendix 4).

Table 52: Choosing the type of regression analysis:

Type of Regression	**Dependent variable (DV)**	**Independent variable (IV)**	**Other notes**
Simple linear	Continuous or discrete	One variable	Very sensitive to outliers, suffers from multicollinearity, autocorrelation and heteroscedasticity. Requires a linear relationship between DV and IVs.
Multiple linear	Continuous or discrete	More than one variable	Very sensitive to outliers, suffers from multicollinearity, autocorrelation and heteroscedasticity. Requires a linear relationship between DV and IVs.
Logistic	Binary	One or more	Used for classification, does not require linear relationship between dependent and independent variables, IVs should not have any multicollinearity issues,
Polynomial			If the power of the DV is more than 1.
Stepwise			It is done by adding/dropping co-variates one at a time based on a specified criterion. Used to maximise the power of prediction using least number of IVs.
Ridge			Used when data suffers from multicollinearity
Weighed Least Square	Continuous or discrete	One variable	When there are heteroscedasticity issues in the model, then weights are created for the variances and then regression is conducted.
Tobit	Continuous	More than one level for the variable	Used when there is a left or right censoring of the DV.

Source: Author, based on: (Breene, 1996), (Field, 2009), (Hair et al., 1998) and (Chatterjee and Hadi, 2015) .

4.1.7.1 Multiple Linear Regression (MLR) between the dummies, factors and ORP:

Initially, MLR regression was conducted between all the dummies, regression scores for each of the factors1 to 6 with the ORP.

For regression, dummy variables were created for the demographic variables with more than 2 levels. For example, for age group 5 dummy variables were created (Less than 25yrs., 25-35yrs., 36-45yrs., 46-55yrs. and 56 & above). Dummy coding represents each of the levels of the variable at a dichotomous level, either as 1 or 0 (Berg, 2013). This was done as SPSS cannot regress IVs with multiple levels and also because nominal and ordinal variables do not have any fixed scale of measurement it is not possible to assume a linear relation between them and the DV (Berg, 2013).

4.1.7.2 Control and the deleted levels for demographic variables in regression:

During regression of nominal / categorical data one of the levels in each of the categories was kept as the control level and the other levels were compared to the control level. Table 53 shows the control levels in each of the nominal variables and the levels/variables that were not used and the reasons why.

Table 53: Control and deleted levels for MLR regression:

No.	Demographic variable	Control Variable/level	Deleted due to no selection of this option
1	Gender	Female	
2	Age group	Less than 25 years old	
3	Marital status	Single	Divorced / widowed Do not wish to say / disclose
4	Type of institution	Autonomous institution	University campus

5	Age of the institution	5 - 10 years	
6	Position in the institution	Associate Professor	Principal
7	Total teaching experience	5 - 10 years	
8	Pay range/month	Rs. 25,000 – 35,000 / month	
9	Industrial experience	Yes	
10	Degrees abroad	Yes	Not used as no respondent had degrees abroad.
11	Teaching time (in %)	Continuous scale variable. They are highly correlated with each other as the summation of each of the respondent's % of duties add to 100%.	
12	Research time (in %)		
13	Paperwork time (in %)		
14	Student monitoring (in %)		
15	Other duties (in %)		
16	Degrees achieved	PG	
17	Degrees working towards	PG	UG, MPhil
18	Working hours/day	Less than 6hrs/day	
19	Teaching related hours/Week	Less than 7 hrs.	
20	Residence from campus	In the campus	
			Deleted Variable

Source: Author

Since the variables 'type of institution' and 'the age of the institution' showed high collinearity whilst checking the Variance Inflation Factors (VIFs), the variable 'type of institution' was deleted from the regression analysis (Marked in red in table 53). VIF is the inverse of tolerance (Miles and Shevlin, 2001). The 'percentage of duties' were not considered, the reason being that the sum of all the duties add to a 100%, so during the regression analysis, they show a very high multicollinearity. A separate analysis was done for the 'percentage of duties' and its correlation with the ORP.

Multicollinearity is seen between the IVs when two of the IVs are related and if they measure the same aspect of the DV, making one of them redundant. Multicollinearity results in higher standard errors and the results might not be reproduced in a different sample (UNC, 2007). After deleting the 'percentage of duties', there were no issues of multicollinearity.

4.1.7.3 Regression between the dummy variables & factors vs. ORP:

Regression equations can be represented in the following way:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta nXn + \varepsilon$$

Where Y is the DV, X1, X2…Xn are the IVs, β0 is the sample's intercept constant, β1, β2… βn are the co-efficient of the IVs and ε is the sample error term (Field, 2009).

Regression was conducted with the factor scores of each of the 6 LVs (See Fig.34) saved from the PCA, dummies and the ORP. Regression is a multiple correlation method in which more than one IV is correlated with the DV, unlike correlation analysis in which there is only one DV and one IV. Regression takes into account not only the variance explained by each of the IVs, but also the shared variance between them (Miles and Shevlin, 2001).

Independence of residuals was checked by the Durbin – Watson statistic (Table 54), which gave a value of 2.126 (close to 2) which is regarded as showing good independence of residuals and that there are no / little correlated errors (Laerd-Statistics, 2015a).

The multiple correlation coefficient (R) has a value of 0.741 showing a moderate to strong association between the DV and the IVs. R is the total correlation between all the IVs and the DV (Miles and Shevlin, 2001). The R^2 (The proportion of variance in

the DV that is explained by the IVs compared to the mean model) value shows 55.0% of variance is explained by the model. That is the addition of all the IVs in the regression model explains 55% of the variance.

The adjusted R^2 value shows 47.3% of variance being explained. This shows that if the model were derived from the population rather than the current sample, there will be a shrinkage of the variance explained by 0.076, or 7.6% (R^2 - adjusted R^2) (Field, 2009). Rather than the R value or R^2 value, the adjusted R^2 value is usually considered as it adjusts for the number of predictors in the model (Field, 2009).

Table 54: Model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.741	.549	.473	40.26439	2.126

Source: Author.

The overall significance of the model was tested, and the P value was found to be less than 0.005 (Table 55), indicating the significance of the model.

The IVs significantly predicted ORP, F (44,262) = 7.250, p<0.005. (F indicates that F test was used, 44 is the degrees of freedom of the model, 262 is the degrees of freedom of the residuals, 7.250 is the F value and the p value is the significance.)

Table 55: ANOVA for MLR regression:

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	517176.824	44	11754.019	7.250	.000[b]
	Residual	424760.026	262	1621.221		
	Total	941936.849	306			

a. Dependent Variable: ORP

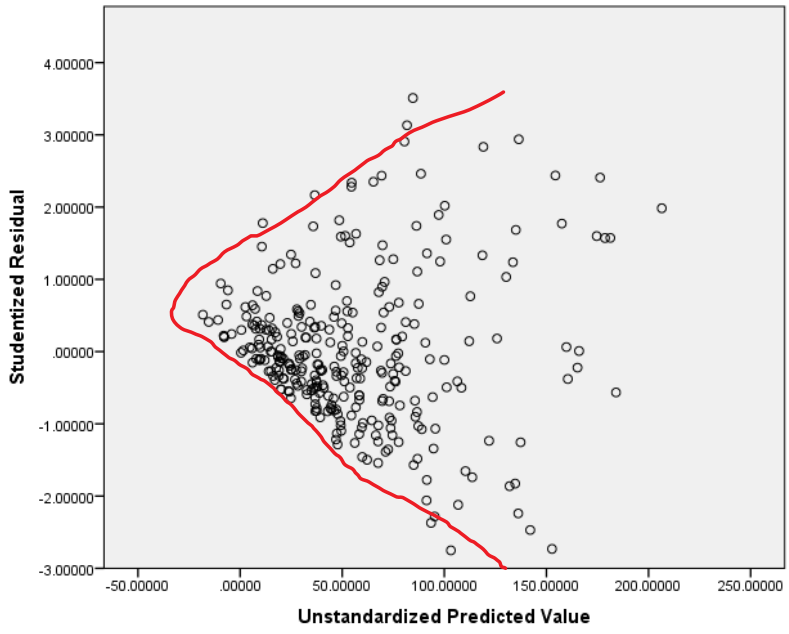
Source: Author.

4.1.7.3.1 Testing for Homoscedasticity:

Homoscedasticity is an important assumption in MLR regression analysis. Homoscedasticity states that the variance of the residuals for the IVs at every set of values is equal (Miles and Shevlin, 2001). If the data is not homoscedastic then it is called heteroscedastic where MLR becomes inefficient in model specification. Homoscedasticity of the data was tested by (See Fig.35) visual inspection of a plot of studentised residuals vs unstandardised predicted values (Laerd-Statistics, 2015a).

The plot (Fig. 35) shows that there is an increasing variance across the residuals. This shows that there is no constant variance in the errors i.e. Heteroscedasticity - as marked by the red line, violating an assumption for OLS regression (Field, 2000). The major problem of forming a model with a dataset which shows heteroscedasticity is that the predicting power of the model formed is not consistent. The predictive power decreases as the unstandardized predicted values (See Fig.35) move from left to the right of the graph, showing a divergence in the predictive power of the model (Laerd-Statistics, 2015a, Eubank and Thomas, 1993, Crown, 1998).

Fig.35: Heteroscedasticity of the data:



4.1.7.3.2 Satisfying the assumptions of MLR Regression:

This section looks at the various assumptions associated with MLR regression and to see if the dataset satisfies these assumptions.

Table 56: Assumptions in MLR regression:

No.	Assumption	Test used	Did it meet assumption?	If no - why?	What does it mean?	Remedial action
1	Data has continuous dependent variable		Yes			
2	Should have 2 or more IVs		Yes			
3	Has independence of errors / residuals	Durbin-Watson test	Yes			
4	Should have homoscedasticity of the variance	Scatter plot of unstandardized predicted values (PRE_1) and Studentized residuals (SRE_1)	No	Shows a funnelling structure	The residuals are not equal for all the values of the DV.	1. Run weighed least sq. method, 2. Run regression with robust standard errors, 3. Run robust regression, 4. Transform DV and IVs. (***Weighed least sq. method will be used.)***
5	There should not be any multicollinearity in the data	VIFs and Tolerances	Yes			
6	There should not be any outliers	Check Studentised deleted residuals (SDR_1) to see if any data outside of 3SD	No	2 respondents' data outside of 3SD	2 Potential outliers	Monitor these data.
7	There should not be any high leverage points	Check Leverage values (LEV_1) if all values less than 0.2	No	57 Leverage points above the critical		Monitor these data.

				value of 0.2		
8	There should not be any highly influential points	Check Cook's Distance Values (COO_1) to see if any data is above 1.	Yes			
9	There should be near normality of the residuals / errors	Check the histogram and Q-Q plot	Yes			

Source: Author, based on: Laerd-Statistics (2015b) and Chatterjee and Hadi (2015).

4.1.7.3.2.1 Selecting Weighted Least square regression:

Due to heteroscedasticity, MLR regression was not used as its assumptions were not satisfied and so Weighed Least Square (WLS) regression was chosen as an alternative (See Table 52 and Table 56). Initially the researcher tried to transform the data using log transform, inverse transform and a combination of both, but they still resulted in heteroscedasticity.

There was an option of conducting an ordinal regression, by splitting the ORP values into three levels: high, medium and low, but this will result in losing a lot of data as the ORP scores will be categorised as just one of the three levels. This was another rationale for using WLS regression.

The weights were created in SPSS by finding the reciprocal of the variance for each respondent. The weights act as a counter measure to bring the variance down for each of the responses, thus giving better results than MLR regression especially when the data has heteroscedasticity (Laerd-Statistics, 2015a).

4.1.7.3.3 Considerations in WLS regression:

A common assumption in all the Ordinary Least Squares (OLS) regressions is that each of the data points have a constant standard deviation of the error term for all the

IVs (Ryan, 1997), this is the assumption of homoscedasticity. This assumption does not usually hold true for all models, for instance this research. In such cases with heteroscedasticity, WLS regression is used where a weight variable is created for each respondents. The weights that are created are relative to the weights of the other observations, this is done to make sure that different sets of weights have identical effect. One of the major advantages of WLS regression is that even with heteroscedasticity it yields a precise estimate of the parameter (Aiken et al., 1991).

However, it should be noted that the weights are estimated and are not absolute values. The effect of using estimated weights is very difficult to assess but small variations in the weights due to estimation does not affect the regression and its interpretation (Ryan, 1997). Also, the WLS regression is sensitive when there are outliers, so it is important to deal with those outliers.

4.1.7.4 Results from WLS regression:

In the initial run, Cook's distance and leverage values were calculated for identifying outliers. Cook's distance is a method of estimating the influence of a particular observation or data point in regression and hence gives an estimate of how much influence the data point exerts on the analysis. All points had a value of less than 1 for Cook's distance, so no significant outliers were identified based on this. Also, the case wise diagnostics showed that there were no points that were outside +/- 3 Standard Deviations (S.D) (Laerd-Statistics, 2015a).

Leverage values are a variation of the Mahalanobis distance to identify outliers. Large scores for leverage values mean that the particular case is far from the sample's multivariate centroid (Field, 2009, Miles and Shevlin, 2001). Similarly, if a particular data has high weight loading, it reflects that the data is further away from the other

values. Based on the initial run, six outliers were identified and deleted. Case no.131 and 324 had high weight loadings and Case no. 140, 224, 192 and 318 had high leverage values, so all were deleted. There were no variables with high Cook's distance. The remaining 301 responses were considered for WLS regression. Thus, the analysis decreases its sensitivity to outliers by eliminating them. The eliminated respondents were looked at to see if there were any striking features that stand out, but no such features were found.

A filter was created in SPSS based on the outliers and the data were selected if:

"*OVERALL_RESEARCH_PRODUCTIVITY_SCORE < 300 & Prob_MD > 0.001 & Weights < 0.1 & LEV_1 < 0.7".*

The variable 'Degrees abroad' was dropped and not used in the analysis as none of the respondents in the data had attained any degrees abroad. Similarly, the variable 'Marital status' showed high correlation with both the age group and the position in the institution. Also, in the initial run, 'Marital status' had a P-value of 0.997, making it highly insignificant, so was not considered. This change is evident in the 'df' (Degrees of Freedom) in the previous (OLS regression) and the current analysis. The final iteration is discussed below.

The Durbin-Watson statistic gave a value of 2.047, very close to 2, indicating a good independence of residuals (Laerd-Statistics, 2015a). The R value was 78.2%, R^2 value of 61.4% and adjusted R^2 value of 54.8% of variance being explained. This shows that if the model were derived from the population rather than the current sample, there will be a shrinkage of the variance explained by 6.3% (R^2 - adjusted R^2) (Field, 2009). The overall significance of the model was tested and P value is less than 0.005, showing that the model is significant.

4.1.7.5 Final regression:

The significant factors are highlighted in Table 57.

Table 57: Regression coefficients for WLS regression:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	90.783	16.132		5.627	.000
	REGR factor score for Changing Academic Environment	-2.166	1.727	-.060	-1.254	.211
	REGR factor score for Academic Dishonesty	4.577	1.553	.133	2.946	.004
	REGR factor score for Indigenous Factors	-3.611	1.741	-.091	-2.074	.039
	REGR factor score for Colleague/Research Environment	1.265	1.609	.038	.787	.432
	REGR factor score for Personal Factor	1.528	1.575	.043	.970	.333
	REGR factor score for Absence of Institutional Support	-1.679	1.573	-.048	-1.067	.287
	25_35	2.475	4.470	.034	.554	.580
	36_45	1.001	8.437	.007	.119	.906
	46-55	-24.264	17.169	-.072	-1.413	.159
	More_than_55	-56.545	54.268	-.098	-1.042	.298
	Less than 5 yrs	-24.309	4.684	-.310	-5.190	.000
	Age of institution between 11 -15 yrs	8.592	5.506	.077	1.560	.120
	Age of institution between 16 - 20 yrs	-8.175	4.228	-.125	-1.933	.054
	Age of institution more than 20 yrs	-26.093	23.682	-.140	-1.102	.272
	Assistant Professor	-17.653	10.406	-.130	-1.696	.091
	Professor	-55.399	37.374	-.116	-1.482	.139
	Head of the department	-34.586	18.293	-.105	-1.891	.060
	Other position in the institution	-19.987	16.650	-.086	-1.200	.231
	Less than 5 yrs of experience	-26.211	4.641	-.328	-5.648	.000
	11 to 15 yrs of experience	34.406	13.168	.131	2.613	.010

	15 to 20 yrs of experience	51.793	29.561	.078	1.752	.081
	More than 20 yrs of experience	79.687	25.705	.231	3.100	.002
	25 to 35K per month	-1.180	4.104	-.015	-.288	.774
	35 to 45K per month	-18.610	10.470	-.095	-1.777	.077
	45 to 55K per month	45.707	26.236	.132	1.742	.083
	55 to 65K per month	24.094	23.690	.121	1.017	.310
	More than 65K per month	7.355	26.148	.025	.281	.779
	Achieved UG	-7.255	9.155	-.050	-.792	.429
	Achieved Mphil	-43.358	7.098	-.295	-6.108	.000
	Achieved PhD	52.420	16.570	.229	3.164	.002
	6 to 7.5Hrs per day	-7.327	4.947	-.110	-1.481	.140
	7.5 to 8 Hrs per day	3.787	4.951	.059	.765	.445
	More than 8 Hrs per day	3.436	6.189	.037	.555	.579
	7 to 14 hrs per week	-.265	7.531	-.003	-.035	.972
	15 to 23 hrs per week of teaching related activities	-11.705	7.153	-.181	-1.636	.103
	More than 23 hrs per week of teaching related activities	-4.692	7.563	-.059	-.620	.536
	Residing within 5 Km of the campus	-12.467	5.971	-.172	-2.088	.038
	Residing within 20 Km of the campus	-5.948	6.134	-.081	-.970	.333
	Residing more than 20 Km of the campus	-9.802	5.921	-.153	-1.655	.099
	No industrial experience	.655	3.772	.009	.174	.862
	Male	-5.305	3.461	-.084	-1.533	.127
	Degree working towards PhD	10.364	3.715	.142	2.790	.006

a. Dependent variable :ORP

b. Weighted Least Squares Regression – Weighted by wts1

P<0.05	P<0.1

The constant value (See table 57) was significant, but it has very less statistical meaning. In terms of the demographic factors, WLS identified variables such as ‘age

of the institution', 'experience', 'degrees achieved', 'residency from the campus' and 'degree working towards' as the significant predictors of ORP of the academics.

The WLS results (Table 57) shows that 'institutions less than 5 years old' have significantly lower RP compared to the 'institutions that are 5 to 10 years old' (This is the control level for this variable, as seen in table 53) The other age groups of institutions are not significant in predicting ORP, with 11 to 15 years old institutions having a $P>0.05$ and so do institutions more than 20 years old. Whereas, 'institutions that are 16 to 20 years old' have lower ORP than the control level and it has $p<0.1$ (i.e., at 10% significance).

Teaching experience influences ORP, with academics less than 5 years of experience having less ORP ($p<0.0001$) compared to the control level, whereas as experience increases, so does the ORP. 11 to 15 years of experience is positively associated with ORP ($P<0.05$), 15 to 20 years has a higher coefficient value of 51.793 ($P<0.1$), but has less predicting power as it is significant at $P<0.1$. Academics with more than 20 years of experience have the highest coefficient for ORP of 79.687 ($P<0.05$).

In terms of the degrees achieved, having an Undergraduate degree was not significantly associated with ORP, whereas having an MPhil negatively influenced ORP, with a coefficient of -43.358, $p<0.0001$. But, having a PhD positively influences ORP, with a coefficient of 52.42 and $P<0.05$.

Academics residing within 5 km of the campus have significantly less ORP coefficient of -12.467, $p<0.05$ compared to the control level. Academics working towards a PhD have a higher ORP coefficient of 10.364, $p<0.05$.

Regarding the regression scores of the factors and their influence on ORP; regression score for factor 2 (Academic Dishonesty) and factor 3 (Indigenous Factors) were

significantly associated with ORP ($p<0.05$). This shows that academics, who perceive that the academic system is dishonest, have low ORP (The more the academics disagree that the academic system is dishonest, the more their ORP), whereas when the academics who perceive that the academic system is honest and is good, have higher ORP.

The reasons for academic dishonesty, why the academics perceive dishonesty in the system and how to counteract them should be carefully studied. To understand the underlying reasons, a qualitative method would be more suited.

Regarding the indigenous factors, it is significant at $p <0.05$. This is an important result from the regression as none of the papers have looked at how indigenous factors influence the ORP of academics. The results show that academics who perceive that indigenous factors are important have higher ORP and those who perceive that indigenous factors are not important, have lower ORP.

4.1.7.6 Possibility of Confirmatory Factor Analysis (CFA):

4.1.7.6.1 Why CFA:

Structural Equation Modelling (SEM) is a popular tool used for confirming or testing a model (Byrne, 2013). The major objective of CFA is to determine if a pre-determined model fits an observed dataset. The six-factor model developed from EFA was planned to be tested for its fit using CFA (See Fig.36). Even though CFA is a model testing method, in this research it was initially thought that CFA could be used as an exploratory tool for improving the model fit. However, due to the constraints described in 4.1.7.6.2, CFA was not used.

4.1.7.6.2 Why CFA was not used:

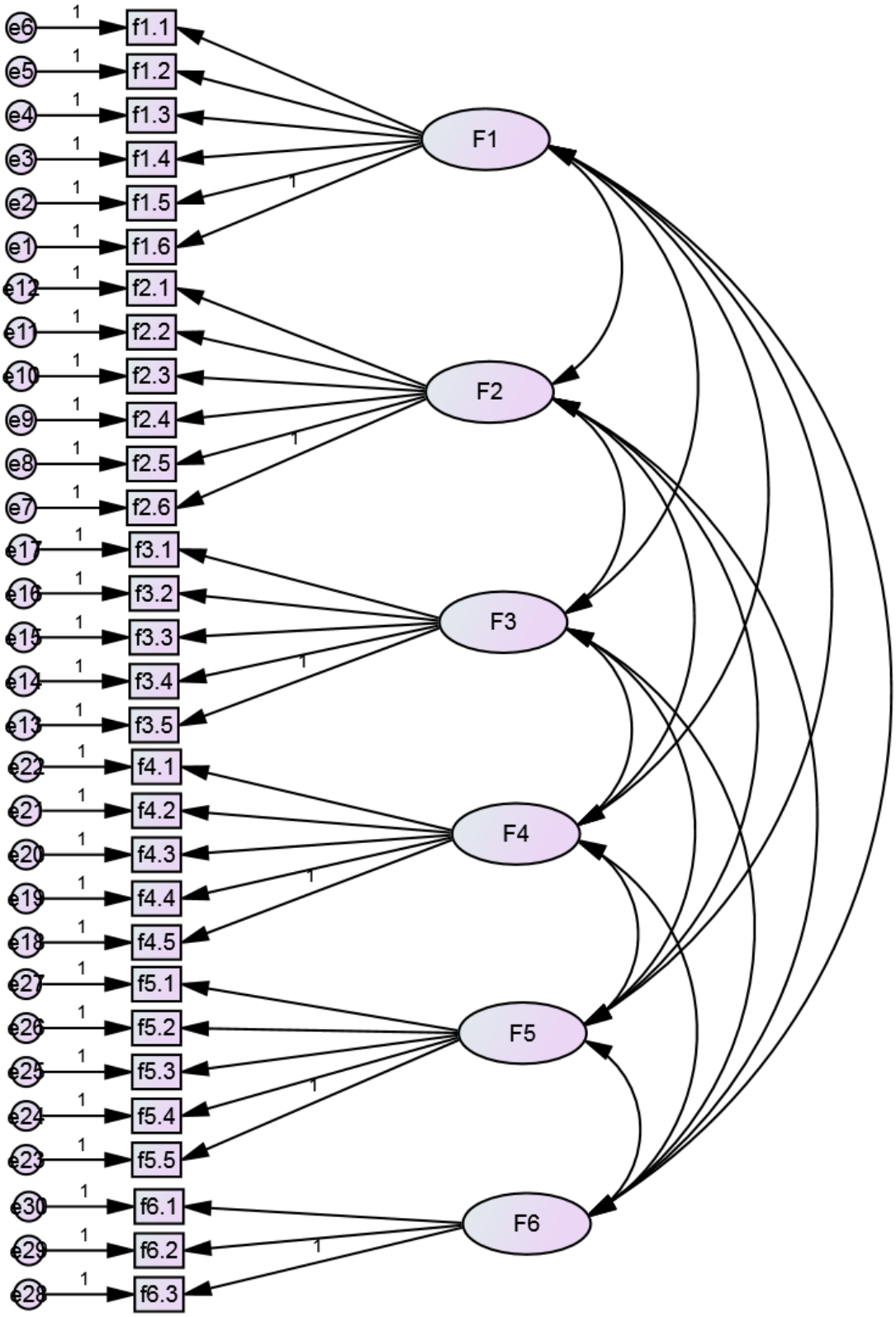
Initially, the researcher tried to use the same dataset for both EFA and CFA. But, Henson and Roberts (2006) and DeCoster (1998) comment that EFA and CFA should not be conducted with the same dataset since the model in EFA was formulated based on the same dataset as the one which is being used to test the model in CFA. With Cabrera-Nguyen (2010) emphasising that different data sets should be used for both EFA and CFA so that the model is formed with one data set and the model testing is based on the other dataset. Cabrera-Nguyen (2010), Henson and Roberts (2006) and DeCoster (1998) comment on using CFA as an exploratory tool by:

a. Deleting poor fitting variables and/or
b. Co-varying the errors

The above two steps might, in practice increase the fit of the model - but it will be done at the expense of theory. They also caution that even though a good fit might result from the above, it might also result in 'Too much fitting' of the model to that particular dataset and it is very questionable on how generalisable the resulting model will be.

Since CFA was considered only partway through the analysis, new data could not be collected and hence analysis was not possible using a new dataset. In order to perform CFA with a different dataset, the researcher tried splitting the data randomly into two halves in SPSS and using one-half of the data for EFA and the other half for CFA.

Fig.36: CFA model:



Source: Author.

To split the data, different sets of random numbers were generated in SPSS based on Gaussian and Poisson distributions. Since there were 307 responses, one-half of the dataset was one respondent higher than the other. Based on each of the different distributions, the data was split into half. But the data to variable ratio became 153 responses / 45 variables = 3.4, which is much less than the recommended ratio of 5:1 by Bandalos et al. (2009), Field (2000) and Heckler (1996). So, CFA was decided not to be used.

In Fig. 36, F1, F2…F6 are the six latent (so represented in ellipses) factors, f1.1, f1.2… f1.6 are the elements that make up the factor 1, similarly the observable elements that make up each of the factors are represented in rectangular boxes. The error term associated with each of the observed variables are represented in circles. The curved arrows are the covariance between each of the factors.

Even though CFA was not used in the analysis, understanding it and was a big learning curve for the researcher.

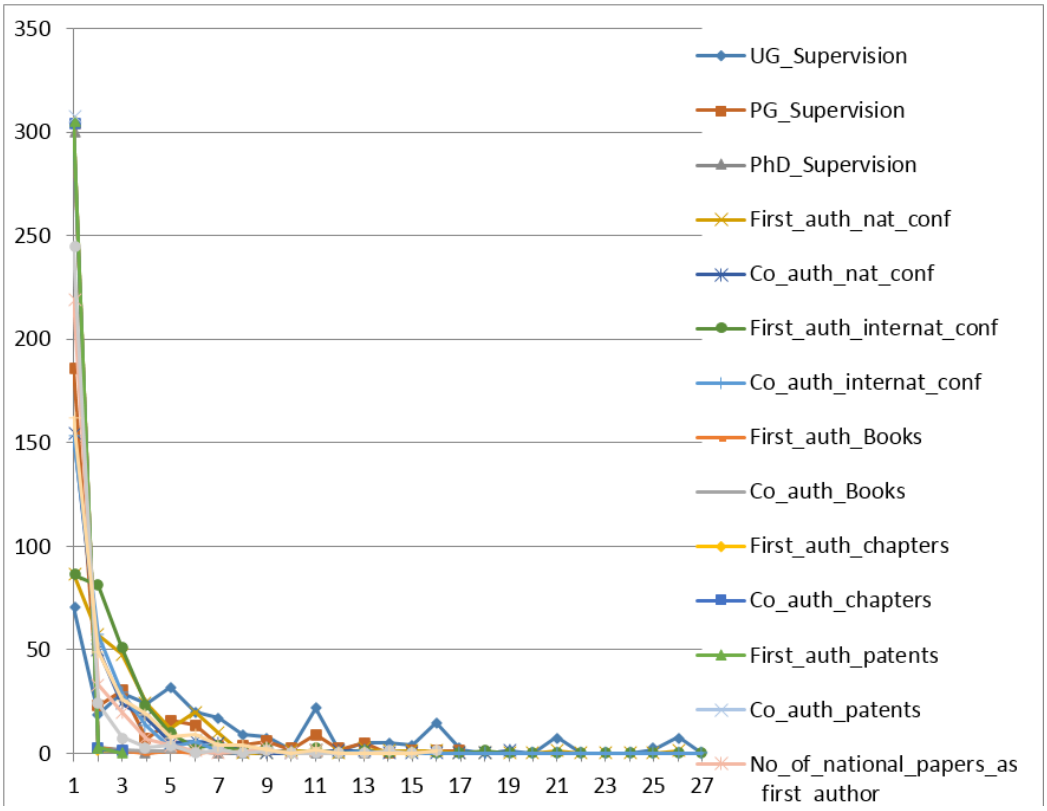
Step 8:

4.1.8 Regression between Elements of Research Productivity (EoRP) and factors and demographic variables:

In addition to the regression between the different factors, dummy variables and the ORP, the researcher was interested to know if and how the different IVs as a combination influence the EoRP. For instance, what factors motivate the academics to write an international journal paper, what motivates them to write a book etc. The

results from this analysis will help the institutions to focus on the particular factors that would increase a specific element of RP.

Fig.38: Frequency of the EoRP – un-truncated: (X-axis: Frequency of the EoRP, Y-axis: Frequency of the academics)

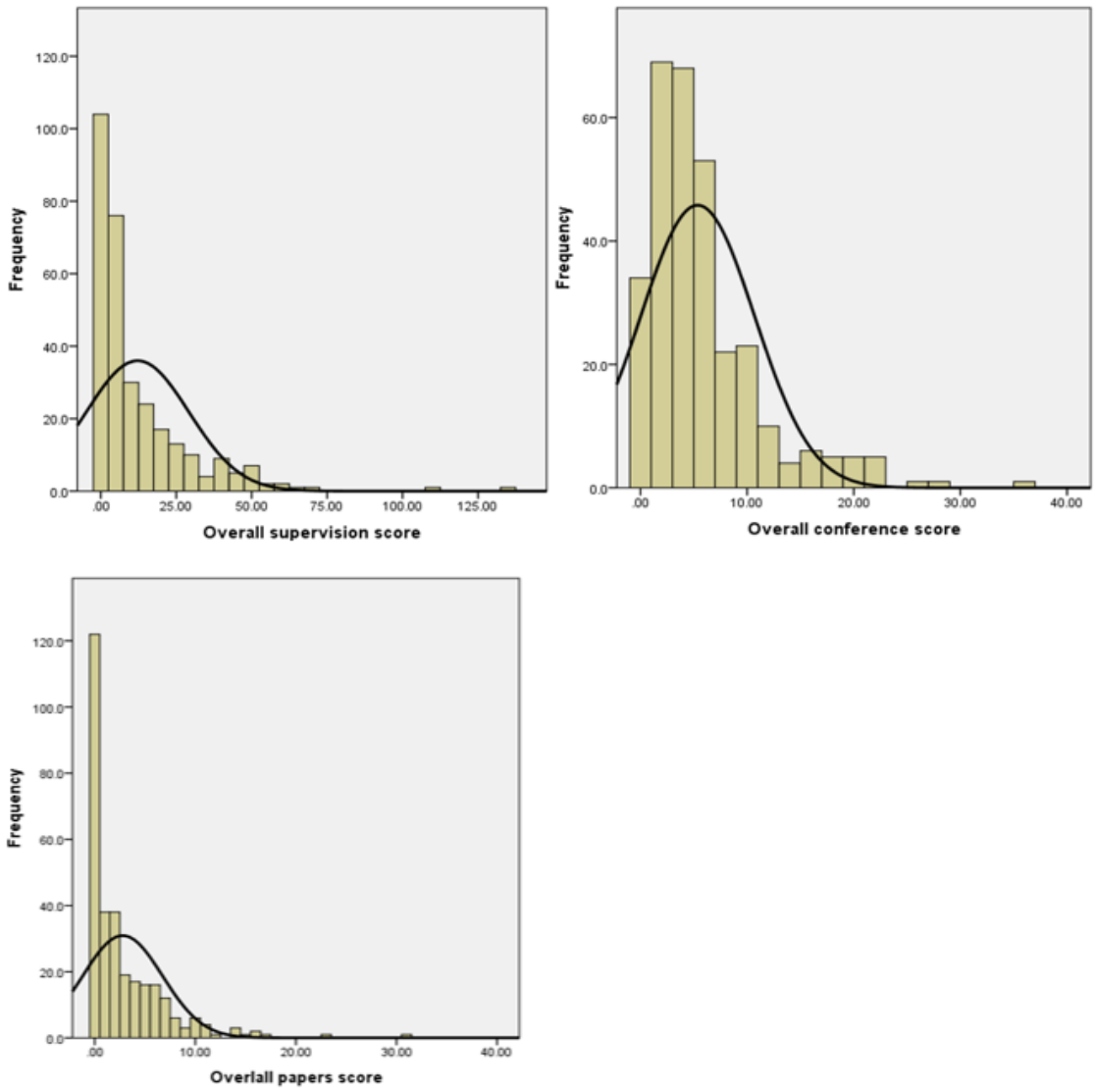


Before regressing using the elements that make up ORP, it is essential to understand the distribution of the various elements of ORP such as the UG supervision (71 respondents have not supervised any UG project, 20 respondents having supervised 1 UG project etc.), PG supervision, number of national papers, number of books etc. Fig. 38 and table 74 (See appendix 5) show the distribution of EoRP. All the curves are highly skewed towards values zero to four, with only the UG supervision having higher values to that of the other EoRP. The truncated frequency graphs (Fig.57 and Fig.58, see appendix 4) show the distribution of EoRP at truncated values of 10 and 5 which gives a better idea of the EoRP distribution.

4.1.8.1 Combining the EoRP to form new DVs:

Some of the EoRP were combined to increase the frequency of the research output. The number of different types and authors of conferences individually had a lot of zero values, so they were combined to form a new composite DV called ‘Overall conference Scores’ (OCS). Similarly, the different types of papers and the authors were combined into a composite new DV called ‘Overall paper Scores’ (OPS) (See table 58).

Fig.39: Frequency distributions of OSS, OCS and OPS:



Source: Author

OCS sums the scores of ‘First author of National Conference’, ‘Second author of National conference’, ‘First author of International Conference’, and ‘Co-author of an

International conference' (See table 58). OPS sums the scores of 'First author of National level journal paper', 'Co-author of National Paper', 'First author of International Journal paper' and 'Co-author of International Journal paper' (See table 58). Similarly, the supervision of UG, PG and PhD were combined as Overall Supervision Scores (OSS).

The frequency distribution (Fig.39) of both variables were skewed to the left towards zero with the mean value for the 'Overall Conference Score' (OCS) was 5.36 and a Standard Deviation (SD) of 5.35, similarly for the 'Overall Paper Score' (OPS) the mean was 2.77 with a SD of 3.96. The mean for the 'Overall Supervision Score' (OSS) was 12.17 with a SD of 17.02. The minimum score for all the three were zero and maximum value for OCS was 35.00, OPS was 31.00 and for OSS was 133.00. A detailed description of the combination is given in table 58.

Table 58: Types of regression for the different EoRP:

No.	DV	IVs	Will it be analysed? Y/N	Reason for not analysing / Type of regression used
1	UG supervision	All Dummy variables + Reg scores	N	No.1 and 2 were combined into one RP element : OSS
2	PG , PhD supervision	All Dummy variables + Reg scores	N	
3	UG+PG+PhD supervision = OSS	All Dummy variables + Reg scores	Y	Tobit Regression
4	First author of Books	All Dummy variables + Reg scores	N	301 Have not first authored a book
5	Co-author of Books	All Dummy variables + Reg scores	N	302 Have not co-authored a book
6	First author of chapters	All Dummy variables + Reg scores	N	302 Have not first authored a chapter
7	Co-author of chapters	All Dummy variables + Reg scores	N	301 Have not first authored a chapter
8	First author of patents	All Dummy variables + Reg scores	N	301 Have not first authored a patent
9	Co-author of patents	All Dummy variables + Reg scores	N	304 Have not co-authored a patent
10	First author of National Conf.	All Dummy variables + Reg scores	Y	
11	Co-author of National Conf.	All Dummy variables + Reg scores	Y	

12	First author of International Conf.	All Dummy variables + Reg scores	Y	No.11, 12, 13 and 14 were combined into one RP element :OCS
13	Co-author of International Conf.	All Dummy variables + Reg scores	Y	
14	Overall Conferences = OCS	All Dummy variables + Reg scores	Y	Tobit Regression
15	First author of national level paper	All Dummy variables + Reg scores	Y	No.16, 17,18 and 19 were combined into one RP element : OPS
16	Co-author of national level paper	All Dummy variables + Reg scores	Y	
17	First author of International level paper	All Dummy variables + Reg scores	Y	
18	Co-author of International level paper	All Dummy variables + Reg scores	Y	
	Overall Papers = OPS	All Dummy variables + Reg scores	Y	Tobit Regression

Source: Author.

4.1.8.2 Types of regression for different EoRP:

Binomial Logistic Regression (BLR) was initially considered for the variables 'overall conferences' and 'overall papers' (Chatterjee and Hadi, 2015, Statistics, 2015). BLR would be used to ascertain which of the IVs can be used to find the likelihood that participants would write a paper, or conference attended etc. It would just indicate a combination of factors and dummy variables that would make the academics for example, co-author an international journal paper or not. It would just say yes/ no to these factors. But it would reduce the predictive power of the analysis to just say yes / no and not give a value, which would be a better result. Table 58 shows the type of regression for each of the EoRP and if no regression was conducted, the reasons why.

4.1.8.3 Tobit regression between UG+PG supervision and the six factors, dummy variables:

Rather than regressing the dummy variables and the 6 factors with the ORP, they were regressed with the elements that make up the ORP. The results of that analysis are shown in this section.

The levels in each of the demographic variables were combined to reduce the number of dummy variables. As the EoRP graph (See Fig. 29) show a lot of responses with zero value individually, combining the levels would make it more interpretable during the WLS regression. The levels were modified according to table 59 and Tobit regression was conducted. The dummy variables were combined in SPSS and new dummy variables were created according to the modified levels.

Table 59: Modified levels for dummy variables and control variables:

No.	Demographic variable	Modified levels	Control Variable/level
1	Gender	M/F	F
2	Age group	<35, 35-45, >45	>45
3	Marital status	Not used as it correlated highly with both the position in the institution and teaching experience.	
4	Type of institution	Not used as it was highly collinear with the age of the institution as seen from the VIFs.	
5	Age of the institution	<10 years, >10 years	>10 yrs..
6	Position in the institution	Junior position, Senior position	> Senior position
7	Department	Computing & IT, Others, Circuit, Mech & related	Mech & related
8	Total teaching experience	<10yrs., >10 yrs.	>10 yrs.
9	Pay range/month	<35K, 35 to 45K, >45k	>45k
10	Industrial experience	Y / N	N
11	Degrees abroad	Not used as none of the 307 respondents had degrees abroad.	
12	Teaching time (in %)	Continuous scale variable	
13	Research time (in %)		
14	Paperwork time (in %)		
15	Student monitoring (in %)		
16	Other duties (in %)		
17	Degrees achieved	MPhil, PhD	PG

18	Degrees working towards	PhD	PG
19	Working hours/day	<7.5hrs/day,>7.5 hrs/day	>7.5 hrs/day
20	Teaching related hours/Week	<14hrs/week, >14hrs/week	>14hrs/week
21	Residence from campus	<20km from campus, >20km from campus	>20km from campus

Source: Author.

Like the WLS regression for ORP, the different 'Percentage of duties' were not considered, the reason being that the sum of all the duties add to 100% so during the regression analysis, these showed a very high multicollinearity. The 'types of institution' was not included in the regression as it also showed high collinearity (VIFs) with the 'age of institution' – so effectively making it redundant. The different departments were also combined and was used in the analysis.

4.1.8.3.1 Rationale for using Tobit regression:

Even after combining the various EoRPs and levels (as in Table 58), there were a lot of zero responses and the number of zero responses (left censored data) is seen in table 60. Only 3.3% (n=10) of the academics scored an ORP value of 0, but when ORP was split as OPS, OCS and OSS, the number of 0 values increases.

A total of 61 academics scored 0 in OSS, 33 Scored 0 in OCS and 119 Scored 0 in OPS, with OPS having the highest number of 0 scores. Zero responses (as can be seen in Fig.29 and Fig.31) creates a lot of data on the left-hand side of the curve. For a similar problem, both (Dubois and Fattore, 2011, Dahlberg and Johansson, 2002) have used Tobit when the data is left censored (cut) and zero being the real value at which the censoring was done. This research adopts the same approach. Tobit regression was chosen to censor the left side of the data.

Note that censoring the data does not mean that the zero-value data are being truncated or those values are not included in the analysis. If the data are truncated

and not considered, then it is called as truncated regression. In Tobit, all the data, censored or not, will be included in the analysis (UCLA, 2018).

Tobit is used when the DV has many values clustered at the limiting values, especially at zero making it problematic to use OLS regression as it would give inconsistent β values (Stewart, 2009), (Wooldridge, 2002) and (Amemiya, 1973).

It should be noted that for calculating the regression line, the Tobit model uses both the censored data and the ones that are not censored, making it better than the alternative methods of just using the values above the truncated value (McDonald and Moffitt, 1980). Another possibility is that separate OLS regressions can be conducted for:

a. Those responses with zero response values and
b. Those with non-zero responses.

But, if the above method was utilised, the coefficients in the regression model would not hold true for everyone in the sample population: as the sample would be selected based on a non-random sample (Either zero, or non-zero response) which would result in not using all the useful information if both the zero and non-zero responses are used together (Breene, 1996) and (McDonald and Moffitt, 1980).

4.1.8.4 Tobit between the dummy variables & factors Vs. OSS, OPS and OCS:

Since Tobit regression was not available in SPSS (support, 2017) another statistics package STATA was used to conduct Tobit regression. Outliers were identified and eliminated.

Table 60: Overall results from Tobit model:

No	Results from Tobit analysis	Overall Supervision	Overall Conference	Overall Papers
1	No. Of Observations	307	307	307
2	F test	F (21,286) = 8.12	F (21,286) = 2.63	F (21,286) = 3.10
3	Prob > F	0.0001	0.0001	0.0001
4	Pseudo R^2	0.0823	0.0321	0.0402
5	Log Pseudo likelihood	-987.887	-1281.0693	-1001.0155
6	Sigma	12.37	23.535	34.412
7	Left censored observation	69	34	122
8	Right censored observations	None	None	None
9	Uncensored observations	238	273	185

Source: Author

The total number of observations used for analysis were 307, similar to the WLS regression. Tobit was conducted to identify the factors that influence academics' RP in terms of Overall Supervision Scores (OSS), Overall Conference Scores (OCS) and Overall Papers Scores (OPS).

In the following models, the data for DVs were censored at zero. Table 60 gives the results from all the three models: Overall supervision, conference and papers. The explanations of what they mean is also provided in table 60.

Where it states F test, the values are F (21,286) = 8.12, $p<0.0001$, where F indicates that F test was used, 21 is the degrees of freedom of the model, 286 is the degrees of freedom of the residuals, 8.12 is the F value and the p value is significant at 0.0001.

Pseudo R^2 is used here as there is no R^2 in Tobit regression as in the OLS regression (Ulrich and Frauke, 2005, Gordon, 2012). Sigma is similar to Root Mean Squared error in OLS regression.

The results in table 60 show that all the models are significant, with the overall supervision, conference and papers to be significant at 0.0001. In all the three models, none of the observations were censored to the right. The number of observations censored to the left are shown the in table 60. The left censored data are the zero scores.

4.1.8.5 Coefficient and the standard errors:

The regression coefficients and the standard errors are represented in the combined Table 61. In the table, the row following each of the co-efficient is the robust standard error corresponding to that co-efficient.

Table 61: Coefficients and robust standard errors for the Tobit model:

	VARIABLES	OSS model	OCS model	OPS model
1	Co-efficient for fac1_1 (Changing academic environment)	-0.342	-0.728	-1.959
		(0.775)	(1.469)	(2.397)
2	Co-efficient for fac2_1 (Academic Dishonesty)	-0.136	2.145	4.354*
		(0.752)	(1.531)	(2.225)
3	Co-efficient for fac3_1 (Indigenous factors)	-1.624**	-3.238**	-3.916*
		(0.760)	(1.534)	(2.262)
4	Co-efficient for fac4_1 (Colleague/research environment)	0.367	-0.408	1.594
		(0.783)	(1.261)	(2.211)
5	Co-efficient for fac5_1 (Personal factors)	-0.194	-2.345*	-5.114**
		(0.654)	(1.396)	(2.223)
6	Co-efficient for fac6_1 (Absence of institutional support)	1.202	-1.891	0.0151
		(0.840)	(1.710)	(2.401)
7	Co-efficient for male	4.597**	0.748	9.309*
		(1.889)	(3.279)	(5.189)

8	Co-efficient for Age less than 35 yrs.	-2.595	3.504	12.85
		(5.227)	(9.048)	(14.64)
9	Co-efficient for Age between 35 - 45 yrs.	3.294	11.25	9.823
		(5.249)	(9.517)	(13.88)
10	Co-efficient for Age of institution less than 10 yrs.	-3.566**	-0.338	2.258
		(1.640)	(2.818)	(4.798)
11	Co-efficient for Junior position in the institution	8.365*	9.685	4.052
		(4.439)	(8.590)	(10.74)
12	Co-efficient for ICT related department	9.606***	11.45***	28.12***
		(2.381)	(4.375)	(7.085)
13	Co-efficient for Other departments	1.086	-7.940	7.563
		(4.015)	(6.236)	(8.774)
14	Co-efficient for Circuit related departments	6.027***	8.889**	21.13***
		(1.935)	(3.552)	(5.801)
15	Co-efficient for Less than 10 yrs. experience	-9.864***	-11.58*	-24.93***
		(3.183)	(6.300)	(8.906)
16	Co-efficient for Pay less than 35K/month	-20.08***	-15.45***	-22.94***
		(2.929)	(5.393)	(7.494)
17	Co-efficient for Pay between 35K - 45K/month	-12.71***	-2.183	-1.761
		(4.294)	(8.286)	(10.66)
18	Co-efficient for Have industrial experience	0.0703	-3.976	5.742
		(1.731)	(3.264)	(4.878)
19	Co-efficient for Working hrs. less than 7.5hrs/day	-2.079	-5.790*	-8.088*
		(1.789)	(3.151)	(4.890)
20	Co-efficient for Less than 14hrs/week of teaching	-1.930	7.064*	4.614
		(1.938)	(3.727)	(5.081)
21	Co-efficient for Residence less than 20km from campus	2.963*	0.0719	5.632
		(1.607)	(2.783)	(4.500)
22	Constant	20.94***	26.85**	4.769
		(6.164)	(11.59)	(14.86)
	Total observations	307	307	307

Source: Author.

Robust standard errors are given in parentheses

*** p<0.01	** p<0.05	* p<0.1

4.1.8.6 Interpretation of the results:

In this section the three models formed in Tobit regression will be interpreted based on the various important factors that influence them.

4.1.8.6.1 Characteristics of the censored respondents:

In terms of the overall supervision, 69 academics scored zero, meaning that they have not supervised any UG or PG dissertations. Looking at the characteristics of these 69 respondents, they are academics in junior position (n=66, 95.7%), less than 35 years of age (n=63, 91.3%), institutions less than 10 years old (n=48, 69.6%), less than 10 years of experience (n=65, 94.2%), get a pay of less than 35K/ month (n= 64, 92.8%), working more than 7.5 hrs/day (n=48, 69.6%), more than 14 hours of teaching/week (n=52, 75.4%). Essentially the minions of academia!

For the overall conference, 34 academics scored zero. These academics were mostly male (n=26, 76.5%), less than 35 years of age (n=27, 79.4%), in junior position (n=30, 88.2%), less than 10 years of experience (n=30, 88.2%), earn less than 35k/month (n=29, 85.3%), working more than 7.5 hrs/day (n=23, 67.6%) and more than 14 hours of teaching/week (n=29, 85.3%).

For the overall papers, 122 respondents had a zero score. These were, mostly male (n=79, 64.8%), less than 35 years of age (n=108, 88.5%), are of the institution is very similar in both the zero and non-zero responses, Junior position (n=118, 96.7%), less than 10 years of experience (n=115, 94.3%), getting paid less than 35k/month (n=107, 87.7%), working more than 7.5hours/day (n=88, 72.1%), more than 14 hours of teaching/week (n=98, 80.3%). Residence from the institution and industrial experience were similar for all the three models in terms of zero responses.

4.1.8.6.2 Factors influencing EoRP based on the results:

From now on, significance will be represented as coefficients with the stars. (i.e. *** p<0.01, ** p<0.05, * p<0.1) where *** indicating p<0.01, ** indicating p<0.05 and * indicating p<0.1. For instance, 2.9** would mean, that the coefficient is 2.9 and it is

significant at p<0.5.

The results from Tables 61, 75, 76 and 77 (See appendix 5) shows that factor 1 (Changing academic environment), factor 4 (Colleague/research environment) and factor 6 (Absence of institutional support) are not significant in any of the three models.

Factor 2 (Academic Dishonesty) is significantly associated with OPS (4.354*). This shows that academics, who perceive that the academic system is dishonest, have lower OPS (The more the academics disagree that the academic system is dishonest, the more their OPS). Academic Dishonesty is not associated with OSS and OCS.

Factor 3 (Indigenous factors) is significantly associated with OSS (-1.624**), OCS (-3.238**) and with OPS (-3.916*). The results show that the academics who perceive that indigenous factors are important have higher OSS and OCS. Those who perceive that indigenous factors are not important, have lower scores for OSS, OCS and OPS.

Factor 5 (Personal factors) is significantly associated with OCS (-2.345*) and OPS (-5.114**). When the academics perceive that personal factors are important, then higher their OCS and OPS.

In terms of the demographic dummy variables, Age group, industrial experience and 'Other departments' were not associated with any of the three models and were left out during the iterations.

Being male was positively associated with OSS (4.597**), showing that being a male gives a higher supervision score compared to female, similarly, males have a higher OPS (9.309*), Whereas, gender does not influence OCS.

Institutions which are less than 10 years old have a lower OSS (-3.566**) compared to the institutions that are older than 10 years, but they are not significant for both OCS

and OPS.

Being in a junior or senior position does not influence the overall score for conference or papers, but in terms of supervision, when compared to a senior position, being in a junior position is significantly associated with supervision (8.365*).

In terms of the department, ICT related departments are more research productive compared to mechanical related department. Being in ICT is strongly associated with OSS (9.606***), OCS (11.45***) and OPS (28.12***). ICT related departments are more productive in all the three research areas compared with mechanical, circuit (Electrical, Electronic Eng.) and other departments. Being in circuit related departments has higher OSS (6.027***), OCS (8.889**) and OPS (21.13***) compared to mechanical related and other departments.

Experience is positively associated in all the three models, i.e., higher the experience, more their OSS, OCS and OPS. Academics who have less than 10 years of experience is negatively associated with OSS (-9.864***), conference (-11.58*) and papers (-29.93***) compared to more than 10 years of experience.

Regarding pay/month, compared to the control group (More than 45k/month earners), those who earn less than 35k/month are negatively associated with OSS (-20.08***), OCS (-15.45***) and OPS (-22.94***). Compared to the control group, those who are earning 35 to 45k/month have lower supervision score (-12.71***), whereas there is no significant difference in their papers or conferences.

With regards to working hours/day, academics working less than 7.5 hrs. / day are negatively associated with OCS (-5.790*) and OPS (-8.088) whereas OSS was not significant.

Compared to the control group, having less than 14 hours/week of teaching related duties was positively associated with OCS (7.064*), but not with OSS and OPS.

Residence away from campus by less than 20km from campus was positively associated with OSS (2.963*) and not with OPS, OCS.

The equations that can be formed for all the three DVs are as follows:

1. ***Predicted Overall Supervision Score*** *= 20.94 – (1.624 X Indigenous factors) + (4.597 X Male) – (3.566 X Age of institution less than 10 yrs.) + (8.365 X Junior position in the institution) + (9.606 X ICT related department) + (6.027 X Circuit related department) – (9.864 X Less than 10 yrs. experience) – (20.08 X Pay less than 35K/month) – (12.71 X Pay between 35K - 45K/month) + (2.963 X Residence less than 20km from campus) + ξ*

2. ***Predicted Overall Conference Score*** *= 26.85 - (3.238 X Indigenous factors) - (2.345 X Personal factors) + (11.45 X ICT related department) + (8.889 X Circuit related department) – (11.58 X Less than 10 yrs. experience) – (15.45 X Pay less than 35K/month) – (5.79 X Working hrs. less than 7.5hrs/day) + (7.064 X Less than 14hrs/week of teaching) + ξ*

3. ***Predicted Overall Paper Score*** *= 4.769 – (4.354 X Academic Dishonesty) – (3.916 X Indigenous factors) - (5.114 X Personal factors) + (9.309 X Male) + (28.12 X ICT related departments) + (21.13 X Circuit related departments) – (24.93 X less than 10 yrs. of experience) – (22.94 X Pay less than 35K/month) – (8.088 X + Working hrs. less than 7.5hrs/day) + ξ*

ξ is the error term associated with the regression.

The research question no. 2 set out to identify the factors influencing the ORP of the academics, but the analysis along with answering it, has also extended itself to look at the factors influencing OCS, OSS and OPS.

Step 9:

4.1.9 Non-parametric correlations between the ORP and the deleted variables:

To see if there are any correlations between ORP and the various variables that were deleted in FA, a non-parametric correlation analysis of both Kendall's tau and Spearman's rho was conducted. The results are given in Table 62 and 63.

Table 62: Non-parametric correlation (Kendall's tau) between the deleted variables and ORP:

Correlations			
			ORP Score
Kendall's tau_b	I enjoy simple and straightforward tasks more than the challenging ones	Correlation Coefficient	.029
		Sig. (2-tailed)	.506
	I prefer to teach rather to conduct research	Correlation Coefficient	.039
		Sig. (2-tailed)	.367
	I doubt if I will ever be able to conduct high quality research	Correlation Coefficient	-.102*
		Sig. (2-tailed)	.020
	In general, I am strongly motivated by the recognition I get from other people	Correlation Coefficient	-.098*
		Sig. (2-tailed)	.028
	As long as I get my PhD, promotion, or better opportunity; I don't really care if people use my research or not	Correlation Coefficient	.015
		Sig. (2-tailed)	.739
	There is a shortage in the number of guides / supervisors for conducting PhD and further research	Correlation Coefficient	.018
		Sig. (2-tailed)	.677
	The psychological satisfaction I get out of research motivates me more than the monitory/materialistic rewards it can bring	Correlation Coefficient	-.021
		Sig. (2-tailed)	.643
	I consider 'Auspicious time', 'Astrology' and/or 'Vaastu Saastram' (Architectural codes) to be of importance while making decisions about the research.	Correlation Coefficient	-.021
		Sig. (2-tailed)	.638
	I will not waste time conducting research – if it does not lead to promotion	Correlation Coefficient	-.036
		Sig. (2-tailed)	.413
	The library and the lab facilities in the college are adequate for me to conduct research	Correlation Coefficient	-.039
		Sig. (2-tailed)	.370

	The colleges are becoming more and more into a money-making machine	Correlation Coefficient	.077
		Sig. (2-tailed)	.079
	There is a lack of public expenditure on research	Correlation Coefficient	-.039
		Sig. (2-tailed)	.386
	There are too few industry-academia links	Correlation Coefficient	.023
		Sig. (2-tailed)	.611
	More than my own abilities, it is because of God's grace that I have achieved so far	Correlation Coefficient	-.019
		Sig. (2-tailed)	.661
	Delays in research process are inevitable and acceptable	Correlation Coefficient	.009
		Sig. (2-tailed)	.833
	ORP	Correlation Coefficient	1.000
		Sig. (2-tailed)	
**. Correlation is significant at the 0.01 level (2-tailed).			
*. Correlation is significant at the 0.05 level (2-tailed).			

Table 63 Non-parametric correlation (Spearman's rho) between the deleted variables and ORP:

Spearman's rho	I enjoy simple and straightforward tasks more than the challenging ones	Correlation Coefficient	.038
		Sig. (2-tailed)	.505
	I prefer to teach rather to conduct research	Correlation Coefficient	.053
		Sig. (2-tailed)	.350
	I doubt if I will ever be able to conduct high quality research	Correlation Coefficient	-.133*
		Sig. (2-tailed)	.019
	In general, I am strongly motivated by the recognition I get from other people	Correlation Coefficient	-.127*
		Sig. (2-tailed)	.026
	As long as I get my PhD, promotion, or better opportunity; I don't really care if people use my research or not	Correlation Coefficient	.019
		Sig. (2-tailed)	.740
	There is a shortage in the number of guides / supervisors for conducting PhD and further research	Correlation Coefficient	.025
		Sig. (2-tailed)	.665
	The psychological satisfaction I get out of research motivates me more than the monitory/materialistic rewards it can bring	Correlation Coefficient	-.027
		Sig. (2-tailed)	.636
	I consider 'Auspicious time', 'Astrology' and/or 'Vaastu Saastram' (Architectural codes) to be of importance while making decisions about the research.	Correlation Coefficient	-.026
		Sig. (2-tailed)	.645
	I will not waste time conducting research – if it does not lead to promotion	Correlation Coefficient	-.046
		Sig. (2-tailed)	.419

	The library and the lab facilities in the college are adequate for me to conduct research	Correlation Coefficient	-.049
		Sig. (2-tailed)	.389
	The colleges are becoming more and more into a money-making machine	Correlation Coefficient	.101
		Sig. (2-tailed)	.076
	There is a lack of public expenditure on research	Correlation Coefficient	-.051
		Sig. (2-tailed)	.372
	There are too few industry-academia links	Correlation Coefficient	.030
		Sig. (2-tailed)	.607
	More than my own abilities, it is because of God's grace that I have achieved so far	Correlation Coefficient	-.025
		Sig. (2-tailed)	.667
	Delays in research process are inevitable and acceptable	Correlation Coefficient	.013
		Sig. (2-tailed)	.826
	ORP	Correlation Coefficient	1.000
		Sig. (2-tailed)	
**. Correlation is significant at the 0.01 level (2-tailed).			
*. Correlation is significant at the 0.05 level (2-tailed).			

The results show that only two variables 'I doubt if I will ever be able to conduct high quality research' (-0.133, $p<0.05$) and 'In general, I am strongly motivated by the recognition I get from other people' (-0.127, $p<0.05$) were significantly correlated with ORP. Correlations are very weak and so no more analysis was conducted on this.

4.1.9.1 Other results:

Table 64: Correlation between the demographic factors and the ORP:

Correlations						
	Gender	Age group in years	Position in the institution	Teaching experience in years	Pay grade in Rupees / month	ORP Score
Gender	1.000					
Age group in years	-.114*	1.000				
Position in the institution	-.062	.480**	1.000			
Teaching experience in years	-.002	.595**	.516**	1.000		
Pay grade in Rupees/month	-.040	.484**	.467**	.661**	1.000	
ORP Score	-.001	.271**	.385**	.492**	.497**	1.000
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

4.1.9.2 Quantitative results informing the interviews:

From the quantitative data, it was evident that AD and the EoCI influence the RP of the academics, but questions such as ‘How’ and ‘Why’ these factors influence the RP is beyond the capability of this quantitative analysis, so these will be explored with qualitative semi-structured interviews. Also, the relation between EoCI and AD, i.e., if and how, they influence each other is explored through interviews.

4.1.10 Conclusion:

This chapter shows the quantitative results from the data. Initially it looked at the characteristics of the respondents, then the non-parametric correlations between the various demographic levels and the ORP. Factor analysis was conducted to identify the latent factors which were then used in regression analysis. After this, EoRP were regressed with Tobit analysis. Finally, the deleted variables were correlated with ORP to see any missing relations. The results will be discussed in the next chapter.

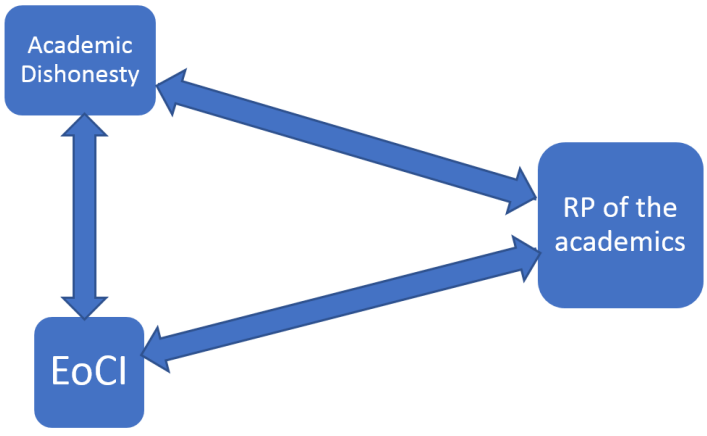
4.2 Interview chapter:

This chapter summarises the answers of the interviews conducted with the academics and their managers. The interview questions were based on research question no.3 and the results from the quantitative analysis. The quantitative analysis clearly showed that the RP of the academics is influenced by “Academic dishonesty at different levels” and “Indigenous factors” or ‘The Elements of Cultural Identities’ (EoCI) From now on, these two terms will be referred to as EoCI. To understand ‘How’ and ‘Why’ these factors influence RP, interview questions were developed (See appendix. 7).

4.2.1 Purpose of the interview:

The interviews were used to identify how the EoCI (which seem to be very personal) were affected by the academic dishonesty and how the combination of them influence the RP of the academics. Also, the interviews were used to identify if there were any interactions between these two factors and if there is an interaction, then how that interaction influences the RP of the academics. Figure 40 shows the purpose of the interview:

Fig.40: Picture of the purpose of the interviews:



Source: Author

A qualitative – interview method is useful to generate a rich data, to explore in depth the questions and to understand the reasons ‘Why’ and ‘How’ a certain phenomenon is happening (Barbour, 2014, Lodico et al., 2010, Miles and Huberman, 1994).

Another advantage of interviews and semi-structured interviews is that there is no time delay between the questions and answers making it very synchronous, non-verbal cues can be noted and that the interviewer can ask questions based on the answers by the respondent (Wengraf, 2001). This is not possible in quantitative method as it mostly concerns with just numbers and that it measures the ’What’ and ‘How many’ types of questions (Cooper et al., 2003).

Overall, the purposes of interviews were:

1. To understand how AD and EoCI influence the RP of the academics?
2. To identify any links between AD and EoCI and how that influences the RP of the academics?

4.2.2 Interview with the target population:

After the quantitative analysis, the results were used to develop the questions to gather the qualitative data. The qualitative questions were also written in line with the research questions. Initially the target population for the interviews were just the academics (Assistant and Associate Professors) and the managers (Professors, HoDs and Deans / Principals). Professors were included in the ‘Manager’ group as they are mostly senior academics with managerial jobs allocated to them. Later, interviews were conducted with the ‘Educational agencies’ as well.

The respondents for the interviews were chosen from the group of academics whom the researcher approached to complete the questionnaire in 2015. The researcher

went to the same institutions which were a part of the quantitative research. The researcher initially approached twenty academics and fifteen managers for interviews. A total of six academics and four managers consented to give interviews.

The others stated that they could not give interviews as they were either too busy, or not available in the city with four last minute cancellations. When face to face interviewing was not possible, telephone interviewing was suggested as an alternative, as Silva et al. (2014) and Morteza et al. (2015) reporting that both face-face and telephonic interviews having similar reliability and correlation coefficients.

Kahn and Cannell (1968) comment on the various reasons why an individual might not be motivated to take part in an interview, which includes: press of competing activities, ignorance of the interview topic, dislike of the interview content and the fear of the consequences of participation

After interviewing six academics, three of them recommended ‘A particular person’ for the researcher to interview who would be able to give more information on the topic. After seven interviews with the academics and four interviews with the managers, there was no new data that came out and the data had saturated. In terms of gender, totally, there were three female respondents, two in the academic level and one at the management level.

Data saturation is defined as the point from which no new themes or information are observed from the interviews (Lattore, 2009). Sample size for qualitative enquiry is a hotly debated topic (Mark, 2010) , but most of the researchers agree that when the data is saturated, it is time to stop (Fusch and Ness, 2015, Marshall et al., 2013, Guest et al., 2006)

Even though the data had saturated, similar to the works of Lattore (2009) the researcher conducted two more interviews with the academics and one more interview with the managers to confirm no new data emerged. No new data emerged from the interviews and so the qualitative data collection based on interviews were stopped.

In total 16 interviews were conducted. 9 interviews were conducted with the academics, 5 interviews with the managers and 2 interviews were conducted with the educational agencies (See 4.2.3).

The interviews were usually restricted to one-hour in length. As Bryman (2003) reports, each hour of interviews takes five to six hours to transcribe. This was true, as it did take the researcher approximately six hours to transcribe each of the interviews, so totalling ninety-six hours.

There were no telephone interviews conducted, as all the interviewees freely consented to face to face interviews. The places for the interviews were left to the interviewees to choose. Ritchie et al. (2014) and Saldaña (2011) suggest that a neutral venue or a location where the respondents feel comfortable was chosen. This was offered so that it would easy for the respondents to talk freely. Among the respondents, three of the managers preferred their institution as the location, two of them preferred to give the interview at their home. Five of the academics chose their institution, the remaining four chose coffee shops. Both the interviews with the agencies were conducted in coffee shops.

Detailed results from the interviews with the academics are given in appendix 2. A few important quotations are listed in the following section.

4.2.3 Interview with the 'Educational consultant agencies':

4.2.3.1 An introduction to the agencies:

Interviews were conducted with the 'Educational Consultancies' or the 'Agencies' or the 'Project Centres' as they are called synonymously. The educational consultant agencies will from now on be just referred to as 'agencies' in this section. Students (U.G., P.G., and PhD), researchers and academics go to these agencies for help with their research projects, or for writing papers, thesis etc.

The agencies provide services including designing and fabrication of hardware, software, the programming, testing, analysis, documentation and publication. The agencies were mentioned many times in the previous interviews (with the academics and managers) as being the source of much of the research published by academics.

As a respondent commented

"The agencies were originally created by the local industries to help students and staff members in their research, but then people saw its potential for making money and now we have what we have, a lucrative business".

A simple internet search showed fifteen such centers in Coimbatore alone, with seven of them offering PhD level projects. There might well be other centers that are not advertised.

As one of the respondents said:

"Just google 'PhD project centres in Coimbatore' (He does it and shows the results in his phone), see how many are there".

It must be noted that initially, the agencies were not a part of the original target population and were added during the qualitative data collection with the academics and managers. Since they were mentioned several times in the interviews, the

researcher decided to add them to gain a rich data. Due to their later addition, a separate list of questions was not prepared for the agencies. The interviews with them were unstructured and the discussions were based on five interview questions.

1. Why do academics approach the agencies?
2. How do the agencies conduct research?
3. What is the perception the agencies have of themselves and of the academics?
4. How they see Academic Dishonesty (AD), Elements of Cultural Identities (EoCI) and the links between the both?
5. How to reduce AD?

One of the advantages with the unstructured interview method is that it lets the respondent to come out with his thoughts that are not restricted by the questions from the researcher and is more flexible (Lodico et al., 2010, Rose, 1994).

The researcher contacted the seven agencies offering PhD level projects in Coimbatore for an interview by calling them in phone and visiting them face to face. Out of them only two consented to give interview. The others cited time constraints as the reason for not being able to give interview. It was clear that they were indeed busy as there were always a group of students in each of the agencies the researcher visited.

The ethical form used for the interviews with the academics was used for the interviews with the agencies as well and the same procedure was followed. Notes were taken during the interview and were transcribed by the researcher. The summary of the views expressed by the respondents is given in appendix 3.

It was explicitly stated to the respondents that the interview is only about academics and not about under or post graduates. To keep the interview more generalised and

not to personalise it to the respondents, the researcher used third person voice / tense for referring to the agencies. As suggested by (Ritchie et al., 2014, Saldaña, 2011), both the interviews were conducted at a neutral venue in a coffee shop, so that it would easy for the respondents to talk freely.

This chapter along with the appendices has given a wealth of data both quantitative and qualitative. The next chapter will discuss the important results and to explore how the results fit in with the literature.

The summary of the interviews with the agencies along with quotations and remarks are shown in appendix 3.

4.2.4 Key illustrative interview quotes:

This section presents a few illustrative quotations from the interviews that were conducted with both the academics and the agencies.

The academics gave a mixed answer to the questions if and why and how important they considered EoCI being important for RP.

"The cultural factors you have asked are very important, this is where we come from, this is our background – so I am sure it will have an impact on how people see and do their research".

"Having a role model and wanting to be one is very important…"

There were quotations disagreeing to its' importance in enhancing RP. These included that the academics conduct research so that they get a promotion, pay rise etc.

"It is just a lie that EoCI influence the ORP of academics, most of them are only concerned with promotion and increment. If you tell them that there is no need to conduct research for getting promoted or for pay rise, very few will do research".

"I differ in my opinion, research is something that has started to become important only recently in the last decade or so before that, Indian academia has been concerned only with teaching. So, the moral duty, God given duty etc. applies to teaching not to research – at least to me".

"99.9% of the people doing research do not do it because they want to be of service, or to find something new, or find new methodology but just for their own personal growth".

A common theme that emerged and that was repeated by seven different respondents was that EoCIs served as an inspiration for people to do research without any dishonesty, whereas people who do not consider EoCI to be important are more prone to AD.

"EoCI does not affect RP directly, but it affects how the academics do research. I would not say that people who have high score for EoCI have more or less publications or something… but those who think that it (EoCI) *is important, will do proper research".*

The need for money, having a quick promotion and getting an increment etc. were seen to be influencing the quantity of research more than the EoCIs, which were clearly having more impact on quality of the research.

"Research has become money oriented now, for both the management and the academics. If I register for a PhD, I want to finish it soon so that I get an increment of Rs. 10,000 to 20,000. To finish soon, I think what to do to finish soon, that is when I will go for shortcuts."

There were some gender differences observed in terms of the opportunities to conduct research.

"Especially for a woman – they must go through the emotions of being a wife, of being pregnant, teaching and in addition I also must go through these emotions of unsupportive supervisor. These are some gender differences."

The academics were asked what their perception of the existence of AD in the institutions. The academics commented that there is AD prevalent in the institutions and that it is a common thing.

"100% there is AD."

"Few years ago, smoking was considered bad and people looked down on smokers, but then as time changed, occasional or social smoking was accepted, and drinkers were looked down upon. Now occasional or social drinking is seen to be common. Similarly, a few years ago AD was frowned upon, but now occasional, well – more than occasional AD is perceived as common in academia."

Survival was commented to be one of the main reason for AD.

"One of the main reasons for AD is survival".

"So, for future survival, it is essential to focus on the research."

AD at different levels were commented upon. These include AD at the academic, organisational and at the Governing body level. The concept of research agencies and the academics using them came up on a regular basis.

"This is a sort of a growing trend. They (Academics) use these people (Educational agencies/consultancies) for writing their thesis or for data collection or for writing a paper etc. There are a few educational consultants and if you approach them, they do it all for you 'A to Z'. You can just sit back, relax and enjoy the ride."

AD was also due to how the current societal *system works.*

"Sometimes the academics who do not want to be dishonest, are forced to be, by the situation."

The AD at the institutional level included several points as detailed in 5.2.1.2 and 5.2.1.3. Illustrative quotations on few of the AD at these levels include,

"Ideally, in an institution, if there are 100 assistant professors (The entry level position in South Indian colleges), then there should be around 30 Associate Professors and may be 5 professors. But in the self-financing institutions, they want only assistant professors as their salary is much lower. There might be 5 associate professors with the principal of the institution being the only professor. Again, this is to reduce the remuneration given to the staff."

"…So, when there is an inspection, then they hire a doctorate holder just for the period of the inspection, create fake records that he (The PhD holder) has been working at the institution for a year or so. When the inspection is over, they get paid and they leave."

"The governing bodies gets money from a few paid journals and including them in the list of recommended / approved journal list. In the span of the two years in which these journals are in the recommended list, they earn profit by getting money from the students and scholars publishing in them. Here again, the journal and the governing body are profited, but the quality of research published goes down."

The academics also stated that it is difficult for the governing bodies to control every institution as there are many of them.

"All the governing bodies know that it (AD) is happening, but the numbers are huge for them to do anything"

There was a consensual agreement that AD had a negative influence on the academics' RP. The pressure that the Institutions put the academics under without providing the necessary resources paves way for academic dishonesty.

"For sure AD influences RP negatively"

"AD does influence the RP of the academics positively in terms of quantity, but in terms of quality – it is very negative."

"The research quality is low because the faculties are not doing research because they want to develop some new concepts or something, just because it is a requirement from the institution which asks them to do so for the ranking."

A major point stated by the respondents was on how AD within the governing bodies has resulted in the growth in number of institutions and seats available for the students which has in turn generated so many problems. This growth is seen to be having significant consequences for the newly founded institutions, their academics and their RP.

"One top level institution is now equivalent to what would have been three institutions. Only after all these seats are filled, people would go to the next level of colleges. This plan of allowing the colleges to increase the number of intakes / seats has resulted in a massive blow to those (Institutions) at the bottom."

"Imagine if you own one of the bottom institutions in which there are totally 120 seats in Mechanical Engineering and you get only 22 students in the classroom. As the college owner – realistically, how are you going to focus on research, or recruit high calibre staff, set up research facilities etc.? "

"So, even if one person starts an institution with a noble intention, they are unable to keep it up for survival reasons."

A few of the suggestions for decreasing AD included the following.

"They (Academics) do not know how to write, so just copy and paste, plagiarise without even knowing that (it) is plagiarism. They need to be taught properly."

"If the punishments for AD are severe, then people will reduce AD to a certain extent."

"The governing bodies should improve their standards, saying that you should publish only in free journals, your research should be of a certain quality etc., when these bodies understand that the quality of research is going down, they should do something about it, they have not."

There were also comments that were negative towards the possibility of reducing AD.

"I am not sure about how to decrease AD at the management level. I am not sure if it can be done."

When asked what changes there should be to increase RP, few of the comments included:

"One way out would be for the ranking system to be altered so that the newly formed institutions are exempt from research for a certain period. So the policy must change."

"The institutions should distribute work load according to the type of academics. If someone is interested in research and conducting research, then they should be given less teaching time and more research time and vice versa."

"If the institutions motivate those who want to do research, it is good."

"Cash awards and giving an identity, incentives can be used. Depends on what the staff want."

"There should be more transparency, all the institution related documents should be online, including the staff and the students. Fake or 'Documented lecturers' should be identified and

punished. The frequency of inspection should be increased. Staff members should be involved and consulted during the inspection."

A major theme that came out of the interview was the link between the AD and the EoCI:

"The EoCI is inside the hearts and thoughts of everyone who start their research or their PhD, they want to do proper research and publish in unpaid journals, want the results to be useful to the society etc., but the AD factors, their environment and their situation consumes the EoCI factors and makes them to be dishonest. For example, if I start PhD with another colleague, he publishes in paid journals and seeks the help of all these agencies and I don't, then he will hand in his thesis earlier and have a few publications in his name."

A few illustrative quotes from the interview with the research agencies include the following. The respondents stated the lack of research skills as a major reason for approaching the agencies. Some of the excerpts from the interviews that spoke of the reasons for approaching the agencies include, lack of research skills, higher pay, unsupportive supervisors etc.

"The academics go to these places because they want to do their PhD or write a paper and that they either do not know how to do it or they need help for doing it. The academics approaching these agencies lack research skills, and when they must do research, they go to these agencies"

"They lack the writing skills and the language skills. So, they ask us to write the synopsis, the thesis and the paper. They are unable to comprehend literature and to know what it says".

"The supervisors are usually busy. They would be usually in a senior position at the institution where they work and will have a lot of administrative things to do. So, they have less time to interact with their students"

"A PhD graduate will be paid at least 2.5 to 3 times the salary of that of a masters' graduate, so by finishing a PhD, it changes their worth."

A few surprising quotes on how the agencies conducted research include:

"Let us say two academics approach the agency with no idea, then the agency would suggest the first academic a title like 'Optimisation of temperature in an office room' and to the other academic they suggest a title like 'Optimising the temperature of a classroom'. So basically, these are the same projects, same computer codes etc. but with small changes in the parameters. This is how you to reduce the work load. It is difficult to do two or more completely different projects at the same time. The project centres are not doing anything extraordinary. If someone has used two sensors, then you use three sensors, that's it."

"Hahaha. Who collects real data? I would definitely say that 95% of the data 'Collected' by the agencies are just made up values depending on what the researcher wants the results to be".

"Mostly the entire data for analysis will be downloaded from the internet, because it is not possible to create all these data out of the blue"

From the interviews it was seen that the agencies look at this as a business and do not associate themselves with AD. To them they are doing a service for which they get paid. As one of the respondent stated:

"We exist since there is a demand. If the academics did it all by themselves then we would have to do something else. At least in the near future, we see that there would be a huge demand for these agencies. This is a real profitable business".

"You are asking if we are cheating. Well, in a way everyone is. Such agencies did not emerge out of nowhere. They have come up because of the system that the current academic system operates in".

"Most of academics who approach us just know the area that they want us to do research, like I want to do a PhD in thermodynamics, or in robotics etc. They have very weak mathematical and programming skills. They will ask us to do the whole thing: Derive the equation, programme it, create a model and test it. They are basically buying what we are doing. They do research just for higher pay".

It was clear from the responses of the agencies who believed that only a few of the academics considered EoCI to be important for conducting research, and it was mostly the lure of an incentive or higher pay that makes them to do research. They also admitted that there are a few academics who want to be ethical and to them perhaps EoCI would be important. From the agencies' responses, it was clear that except in considering that AD and EoCI are opposites, the agencies did not have any thought of the link between the both.

"I know a few of them as well, who want to do it all on their own, wait for the journals to accept it, modify it on their own etc. even if it takes a while. Though rare, they do exist".
"There would be a very few academics in each of the institution for whom EoCIs would be important".

Overall, it was is evident from the interviews (In the section below) that the agencies were aware of the various forms of AD happening at the institutions and that that it is difficult for an academic to be influenced by EoCI, whilst working in an environment that is prone to AD. When asked about the influence of AD on the academics' RP, it was believed that the quantity of research might have increased but the quality and the usefulness of the research has gone down. A lot of 'Junk papers' are produced which does not add to any scientific progress.

Researcher: "How does AD affect the RP of the academics?"
Respondent: "What research?"
"The papers pushed in a hurry through low quality journals are just useless with no one referencing (Citing) *them and it would just be another junk paper."*

The agents stated that in order to reduce AD, the system itself needs changing which is going to take a lot of effort. On a smaller scale, few of the suggestions from the respondents include:

"They should do research for the right reasons, not just for the monetary benefits".
"If the salary of a PhD holder was not three times higher than that of a P.G. (Masters / post graduate) *holder, then having to do fake research for promotion might not be that tempting for them".*
"The management should set an example for the other staff members to follow. P.G. students who do their dissertation with us when they go to teach, would not be able to teach the students properly".

Chapter 5 Discussions

The first sub-chapter (Chapter 5.1) of the discussions chapter will look at the demographic factors and its influence on the RP of the academics. The second sub-chapter (Chapter 5.2) looks at the influence of AD and EoCI on the RP of the academics.

Note that RP is the generic term used to denote Research Productivity, whereas ORP is the term used in this research that is a sum of the scores for books, patents, conferences, chapters, supervision and the papers. Elements of Research Productivity (EoRP) are the scores for supervision (Overall Supervision Score (OSS)), conferences (Overall Conference Scores (OCS)) and papers (Overall Paper Scores (OPS)).

5.1 Discussions on the influence of demographic factors on the RP of the academics:

The ORP curve shows that most of the academics do little research, while a very few researchers conduct most of the research. The data reveals that 3% of academics had no ORP at all in the last five years. 14.1% of academics with a score of less than 10. 35% of the academics scored less than 50 and a total of 83% of academics scored 100 or less. The relative highfliers scoring more than 150 were a mere 9.9%.

Comparing with other nations, the ORP curve (Fig.1 in Appendix) is similar to that of Horodnic and Zait (2015) who looked at the ORP for Romanian academics showing that their RP is similar to that of the respondents in this research in that few academics produce most of the research. The work of Brew et al. (2015) who look at Australian

and English academics, show that around 60% of the academics had a medium RP, while 17% had high RP and 23% had low RP, this is in contrast with the RP in this research, where most of the academics had low RP.

In terms of the EoRP, similar trend with that of ORP is seen, with most of the academics having low scores and a few academics having a high score. 22.5% of the academics have not supervised any projects including undergraduate supervision and 61.2% of the academics having an Overall Supervision Score (OSS) of 10. In terms of the Overall Conference Score (OCS), 11.1% of the academics have not attended any conferences and a surprising 86% of academics scoring less than 10 for OCS. Even more surprising is Overall Paper Score (OPS) in which 39.7% of the academics have not published any papers at all, and 93.5% of them having a score of less than 10 OPS. This shows that most of the academics attend conferences to increasing their RP score and that publishing papers is what they least focus on. It is pertinent that India improves its RP to maintain its competitive edge with the BRICS countries and in the world, with Reddy et al. (2016) commenting that India lags far behind than its neighbour China in research publication and the facilities.

5.1.1 Reasons for low RP:

Reasons for the low ORP as stated by the respondents include lack of research skills of the academics, the lack of research focus by the HEIs and Academic Dishonesty (AD) at all levels. Also the interviews reveal that the academics have mostly been focussing on teaching and improving its quality, with having to conduct research being something relatively new for them. That the newer HEIs are struggling to establish themselves with their short term and economically motivated focus of especially the private HEIs are the other reasons for the Low ORP. These will be explored more in chapter 5.2.

A significant point mentioned by the academics in the interviews was that rather than wanting to conduct research they are forced into it simply to survive as an academic.

"It is just for survival that people do research, only 1 out of 100 do research out of passion, the others for mere survival. Passion is something personal for each of them".

"Most of the people do research not because they really want to do it or out of their own interest, but it has become mandatory for them to do it to stay in teaching. Survival is one of the main factors for them to do research."

The current HEI ranking system introduced by the government (NIRF, 2015) was cited as one of the reasons that the academics are forced to conduct research. The respondents further stated that the ranking system has only managed to increase the quantity of the research and not the quality.

It would be interesting to explore the perceptions the academics with different levels of RP have towards research, teaching and other duties. This would be a similar work to that of Brew et al. (2015), but from the perspective of a rapidly developing country such as China or India. Also how their perceptions vary according to their demographic characteristics would be interesting. A qualitative study on the same will offer more insights.

This research finds the differences in RP of the academics according to their individual demographics. Okonedo et al. (2015) who found no significant variations in the RP based on demographic differences. But their research is within the Nigerian HEIs, which is based on a completely different culture.

The results show that individual attributes such as age group, position in the HEIs, teaching experience, pay scale, marital status, type and age of the HEI the academic is working in, time allocated for different duties, degrees working towards and working hours per day influenced ORP of the academics to varying degrees. In terms of the OSS, OCS and OPS all showed differences demographically.

5.1.2 Influence of gender on the academics' RP:

The results show that both male and female show a similar ORP which can be seen from their mean ranks and the $\chi 2$ test ($\chi 2$ (1) = 10,445.5, P=0.993). This is similar to the results obtained by Vuong et al. (2017), Gonzalez-Brambila and Veloso (2007) and Bland et al. (2005) who in their quantitative works found no difference in the RP and the OCS, OSS and OPS between gender. Whereas, it contradicts the works of Subramanian and Nammalvar (2017), Kyvik and Teigen (1996) and Aksnes et al. (2011) who suggests that there are gender differences in RP. Among the above studies only Subramanian and Nammalvar (2017) was conducted with Indian academics.

Nevertheless, attributes such as parenting and bringing up the children which Ogbogu (2009) found to influence the RP, in this research is not seen to affect the RP in terms of gender, which Hunter and Leahey (2010) comments is important.

From the quantitative data, even though the RP is same for both the genders, the interviews revealed the differences between male and female academics' research. The respondents stated that conducting research is more difficult for a female than a male academic in an Indian context and that the female academics face more problems than their male counterparts, as also pointed out by Chanana (2000). As one of the respondents put it:

"Especially for a woman – they must go through the emotions of being a wife, of being pregnant, teaching and in addition they also must go through these emotions of unsupportive supervisor. These are some gender differences."

Another respondent connected the Indian culture, the role of female and the possible help the HEIs could provide to help female academics to conduct research:

"Female faculty should be given more time (to conduct research) or less teaching load when they are doing research. India being a more traditional country, taking care of the family, the children, the elderly and the chores usually fall on the female. So, it is very difficult for them

(Female academics) to pursue a research career even if they want to. This is not so much of a problem to the male academics."

Another respondent commented that there should be proper support mechanisms put in place for female academics by the HEIs, especially for those with children. Further research should be conducted to qualitatively explore the difficulties faced by the female academics and how the research policies of the HEIs can counteract them.

5.1.3 Influence of marital status on the academics' RP:

The results show that married academics are more research productive than their single counterparts. They are also more productive in supervision, conferences and in publications. This is almost certainly because single academics are generally younger compared to their married counterparts. Also that the single academics are in the early stages of their carrier.

It should be explored in detail how marital status of the genders influence the ORP of the academics – being aware that females get married younger than male in India and also that traditionally female take more responsibility of child rearing and for family compared to male. Rather than exploring the influence of marital status, it would be better to look at the influence of the age group and the position in the HEIs which are correlated with the marital status.

5.1.4 Influence of age group on the academics' RP:

With regards to the age group the results show an increased ORP as the age of the academic increases. A similar trend of increasing OSS and OPS were seen, but no difference was seen for OCS. Whereas Bland et al. (2005) and Gonzalez-Brambila and Veloso (2007) found no difference in the RP between age groups. The results

contradict the works of Subramanian and Nammalvar (2017) who comment that the RP is U shape, with the academics in the middle age group seeing a drop in their RP.

Similar to the result from this research, Vuong et al. (2017) show an increase in RP with age, with RP being low in the initial stages of the academics' career and increasing from then on. This contradicts the research by Sabharwal (2013) and Bland et al. (2005) where the academic RP decreases as their age increases but with age the number of books and monographs increases, this could not be observed as very few academics have written books in the sample.

Since there are only 4 respondents who were more than 55 years old, this research combined the respondents older than 45 years into one group. So, this research is unable to study academics who are more than 55 years old regarding their OSS, OCS and OPS.

The low number of older respondents reflects the actual demographics of the age group in Coimbatore's engineering HEIs which has a lot of young academics. The mean ranks (fig. 49) show that the RP of academics is a similar value for the groups 'Less than 25 years' and '25 to 35 years'. The RP sharply increases from '25 to 35 years' to '35 years to 45 years'. Academics who are less than 25years old have the lowest RP, this may be because the academics might start their PhDs or embark on research activities between these years.

In the future, a non - random sampling could be done to include more respondents who are 55 years or more to study their RP.

5.1.5 Influence of the type and the age of HEIs on the academics' RP:

The type and the age of HEIs should be taken into consideration together, as older HEIs that were founded before 2000s are either Deemed or autonomous institutions and newly founded HEIs after the 2000s are mostly affiliated institutions. This was checked with a Pearson correlation which showed a value of 0.558, $p<0.01$, showing the interaction of the age and type of the HEIs. This is similar to the results by Ramsden (1994), where more established universities had higher RP.

Post hoc testing (fig.50 and fig.52) shows that Deemed Universities have the highest mean rank of ORP followed by the autonomous and then the Affiliated HEIs. This is expected as the Deemed institutions are older and are more established, followed chronologically by autonomous institutions and the affiliated institutions. Similarly, the older institutions are more productive than the newly founded institutions. However, it is surprising that there is a dip in the ORP of 16-20-year-old HEIs, with their RP lower in both mean and median compared to institutions that might be half their age (5 to 10 year old HEIs).

The same trend of ORP and its dip for institutions which are 16-20 years was seen for OSS and OPS. But for OCS, there was a linear increase with respect to the age of the institution. As the HEIs get older, they are more established and can afford to spend more money and resources for research, to develop a research base and to get a 'Research centre' status, but the dip in ORP puts this in question and should be further explored.

In order to understand the reason for the dip, the age of the institution and the time spent by the academics on research according to the age of the institutions they worked in was calculated. The results show that all ages of HEIs spent about the same

% of time on research, so no significant difference was found that could explain the reason for the dip. A separate research that focuses on the reason for the decrease in the RP of the 16-20-year-old institutions can be done.

5.1.6 Influence of the department on the academics' RP:

Since there were a lot of departments, they were combined into four groups as shown in Table 59 in the results chapter. A Non-parametric test of difference and a post-hoc test show that ICT related departments are most productive, with Mechanical related departments with the least ORP. The same trend was seen for the EoRP.

Further studies should be conducted to understand the reasons for the ICT academics being more productive than other departments. With mechanical engineering related departments having one of the most number of student intakes, the facilities available in the institutions for research should be more compared to the other departments. The future research should also try to identify if there is any relation between working in a highly productive department having an influence on the RP of the academics in them.

5.1.7 Influence of the position in the HEIs on the academics' RP:

In terms of the position of the academics with their ORP and the EoRP, the head of the department, associate professors and professors all have similar RP, the stark contrast is with the assistant professors who have lower ORP. The reason for the assistant professors to have low RP might be due them being in their early stages of their career, supporting this, Table 64 shows a moderate correlation between teaching experience and the position in the department (0.516**).

One of the reasons for the academics at higher position having high ORP is that if they are supervising / heading a research group, their name gets mentioned even if they are not directly involved in the research (Rørstad and Aksnes, 2015, Aksnes, 2012). This is also evident from the interview data in which a respondent comments:

"… In India, usually the first author is the guide, so he gets credit for a work that the student has paid for. Again, the guide is just looking for numbers, even though he is research dormant for years, just by the publications of the students it inflates his RP. …."

As the position and the experience of the academics increase, so does their 'accumulated advantage', dubbed the Matthew effect. Allison and Stewart (1974) comments that accumulated advantage does play a major role in the RP of the academics, with more established academics having more contacts, networks recognition, feedback and resources will improve or maintain their RP.

With regards to the correlation between position and pay (table 66), it is surprising that there is only a moderate correlation between them (0.447*). This may be because the HEIs formed after mid-2000s promote young academics to be Heads of Department (HoD), but do not pay them the proper salary for that position. Being a HoD at these HEIs is given as an additional duty to the academics for a small pay rise and only a few of the HoDs have any formal research qualification such as a PhD or might be currently conducting their PhD. This should be more carefully examined with a non-random sample that includes more HoDs.

The position in the HEIs and teaching experience, pay grade are moderately correlated (0.447, p=0.01), showing that more experienced academics are higher up in the position and have higher pay than those at lower positions.

5.1.8 Influence of teaching experience on the academics' RP:

The results show that there is a difference in the RP of academics with different teaching experiences. Academics at the early stages of their career have the lowest scores of the mean ranks for RP. Comparing the 'Less than 5 years' and '5-10 years of experience', there is a steep increase of 52% in the mean rank from 115.43 to 175.41. The percentage increase of ORP is much slower at 26.55% from '5-10 years' to '11-15 years'. It slows down further to 8.11% from '11-15 years' to 'More than 15 years of experience'. This shows an almost linear relationship between the experience and the RP, with a correlation of 0.492** between them. Similarly, OSS, OCS and OPS increase as the teaching experience increase, with OPS increasing more with experience compared to OCS and OSS which have similar values.

From the WLS regression (Table 57), it is very clear that the co-efficient (β) for ORP increases with experience. Compared to the academics with 5-10 years of experience, the academics who have less than 5 years of experience having a negative β score (-26.211***), which increases to 34.406** for those with 11-15 years of experience, to 51.79* and finally increases to 79.68*** for those with more than 20 years of experience. This shows the increase of RP with the teaching experience. This is reflective of the works by Ebadi and Schiffauerova (2016) and Callaghan (2015), who report that the RP increases with experience in Canadian and South African HEIs respectively.

The management should make sure that the working conditions (such as teaching load, administrative load, availability and allocation of resources) for the academics reaching 10 years of experience should be conductive to research, making sure they do not slowdown in their research activities. The overall increase in RP with years of

experience might again be an effect of the accumulated advantage similar to the position in the HEIs.

5.1.9 Influence of pay on the academics' RP:

Looking at the influence of pay scale on RP, Table 64 shows that Pay scale is more correlated (0.61**) with teaching experience than with age group (0.484**) or position within the institution (0.467**). The ORP scores are moderately correlated with the pay scale (0.497**) meaning that higher the pay, (moderately) higher the ORP.

This increase in ORP with respect to pay (table 69) can be seen from the mean rank of the academics' ORP increasing from pay bands of 'Less than 25k/month' to that of pay bands '35-45K/month', after which the ORP reduces from '45-55K/month' to '55-65K/month'. The score is the highest for academics with more than 65K/month, thus showing a double peak. OCS and OPS scores the same trend as the ORP scores, but the OSS scores are linear with pay grade.

Overall, teaching experience and pay scale are the ones that are most correlated with ORP, so academics with more experience and at a higher pay scale produce more research compared to those who are starting their academics career and at a lower pay scale. Horodnic and Zait (2015) in their work report that ORP and pay are directly proportional to each other only to a certain extent after which an increase in the pay does not contribute significantly to the ORP.

The strong correlation (0.622**) between the pay grade and the teaching experience in years show that the academics with more than 65 K / month are senior and more experienced academics who might be guiding PhDs and so might have their name in the papers, thus increasing their RP. This would also explain their high OSS.

Salary is reported to be a major motivating factor as can be seen from Agarwal (2006b) and Deepanjana (2011). Further research is needed to check the influence of salary on the RP and the motivation to conduct research of academics with different levels of RP.

From the interviews, it was clear that the major reason for doing a PhD or publishing a paper is to get a promotion or higher pay, showing the direct influence of wanting a higher pay on the RP.

"A PhD graduate earns 2.5 to 3 times higher the salary of a Masters graduate."
"Basically, it is a (About) survival now, academics do PhD so that they can survive being an academic ... It also gives them a better salary…"
"Everyone needs money, that is the ultimate requirement. What can you do without money? Research and all those things are for making money…"

Since the interviews were not focused on the demographic influence on the RP of the academics, there are no extensive data from the interview on this point. However the interviews revealed that the academics are not paid proper salary and also that they are paid in arrears, which would impact on their RP. This is explored in 5.1.10 and in 5.1.11.

5.1.10 Influence of Improper pay on the RP:

A striking point is that 37.4% of the respondents are paid less than 25K/month, which is pretty low to live in a city like Coimbatore, especially if they are to support their family. With such a low pay, Aggarwal and Medury (2012) and Sharma and Jyoti (2009) point out the professional satisfaction would be low, which may have serious negative implications on the RP of the academics. The interviews revealed a direr situation in which many HEIs do not pay the academics for 3 to 4 months altogether and pay them the salary they are owed for the previous months in arrears.

"There are institutions they pay their staff less money as wages than what they say they pay on paper. There are many occasions in which the institutions do not pay the staff salary for 3 to 4 months altogether. How can an academic with a family that too in a city like Coimbatore

survive for a few months with no salary and having to go through pressures at the institution and on top of all these – having to do research?"

Along with the low pay, the reducing quality of the students (87.3% of the academics state that the quality of the students entering engineering education is declining), significant increase in the workload (86.4% of the academics agree or strongly agree that there has been a significant increase of work load) and the high level of administration / paperwork (88.3% of the academics agree or strongly agree to this) the academics have to do, they state that academia is becoming less attractive as a career, with 70.7% of academics agreeing or strongly agreeing to this. In this pressurised environment for the academics to get a higher pay or promotion, they have to conduct research, and to accomplish it quickly, they indulge in AD.

Exploring further, the type of HEIs and the pay grade are moderately correlated (0.471**) showing that respondents from Affiliated HEIs are paid less compared to their counterparts in either Deemed or autonomous HEIs. This raises an important issue in the HEIs, the academics are often not being paid the proper salary.

Even though the newly formed private HEIs advertise that they will pay academics as per the norms / stipulations set by the Governing bodies (University Grants Commission, UGC), they seldom do it (Jain, 2015). With low pay and the lecturers being expected to deliver the same amount of work as a well-paid academic at a different HEI, the academics lack the incentive to conduct research. This was also reflected in the interviews:

"Proper salary should be given to academics, according to the norms. There are some institutions that pay less than Rs. 10,000 to their academics, (This is a third of what they should be paid according to the UGC norms) *to put it in perspective, a person with just a 10th standard education (Eqv. of GCSE) working in a petty shop, or in a construction site earn (s) more money than this. How are the academics to survive and how are they to take pride in being an academic, working for such a low salary after having graduated in Engineering, which is supposedly a high earning profession."*

"The management wants the staff to do more and not pay them the proper pay. This is dishonesty as they pay less than the amount written on the official paper. These academics will be more vulnerable to be dishonest."

The impact of improper pay has not only affected the RP of the academics but also their sense of being as an academic, which from the Vedic times has been seen as a noble profession.

The HEIs should remunerate the academics according to the UGC norms. Low paid academics will be more focused on their lower level needs and for them to focus on a higher-level need such as research or to invest money to improve their research skills would be very difficult. On the other hand, academics with considerable research experience and a good track of publications will not choose to work in HEIs with a low pay, thus reducing the RP in those HEIs further.

5.1.11 Institutions cutting cost by recruiting fresh graduates:

To cut remuneration costs the HEIs regularly recruit freshly graduated undergraduates to teach the students (Subramanian, 2015). This 'Student yesterday, lecturer today' approach has created ill equipped academics who are not properly trained to conduct research or to teach. The interview with the 'educational agencies' confirmed this practice, with the institutions hiring their own students who are finishing their UG studies. The agencies further commented that when these newly graduated academics are asked to conduct research and to publish, they approach the agencies. This starts a cycle of AD in research.

At the institutional level, changes that could be made including recruiting academics with a research qualification and a track record of previous research, remunerating properly and promoting them based on criteria that included their research activities would help to improve the RP of the HEIs.

5.1.12 Influence of the academics' industrial experience on their RP:

Ebadi and Schiffauerova (2016) and Drivas et al. (2015) report that RP is positively associated with academics who have industrial experience, whereas this research found no difference in the ORP, OSS, OCS and OPS of those who have and do not have industrial experience. Drivas et al. (2015) report that institutions which work closely with industry tend to have greater RP. However Hottenrott and Thorwarth (2011) comments that funding from the industries that restricts publications is detrimental to RP.

An interesting reveal from the interviews shows why people working in industries might not consider joining academia. First of all, their industrial experience is not considered as work experience relevant for promotions in the institutions and they are expected to start from a junior level. This also means that they will have a lower salary than they had while working in industry.

> *"Industrial experience is not taken into consideration for promotion, only academic experience is. So, when an industrially experienced person wants to join the institution, he will have to start as an assistant professor and for a much lower salary than what he was earning in industry. This discourages people with industrial experience joining academia."*

5.1.11 Influence of the residency from campus on the academics' RP:

In terms of the residency from the campus, the WLS regression shows that compared to the academics residing in campus, those residing within 5km of the campus have a lower ORP (-12.46**) and those residing more than 20 km from the campus (-9.802*). But this result adds nothing to the research and there is no linear relation between these two could be observed. Especially most of the engineering HEIs are located far from the city. Also, that the non-parametric statistics show no difference in the ORP, OSS, OCS and OPS of the academics based on their place of residence.

5.1.12 Influence of the degree achieved and degree working towards:

In terms of the degrees working towards, academics who were working towards a PhD were more productive (ORP and all the EoRP) than those who are not and those who are pursuing their Masters. One of the reasons being that it is mandatory for those pursuing their PhD to publish two papers, thus increasing their RP.

This observation is similar to those of Aksnes (2012) and Bailey (1999), who comment that the RP of academics who are pursuing a PhD or who are already doctorates have a higher RP. The high overall contribution of a PhD student to the RP of a department and institution is reported by Lariviere (2011). Also, that those who are working towards a PhD would be spending more time on research (apart from their work time) than those who are not pursuing a PhD.

Fig.28 shows that the academics with a PhD have a mean ORP score that is 271.5% higher than those with a Masters and is 1449.2% higher than those with only UG qualifications, but it should be noted that there are only 7 responses with UG, so they will not be considered further. Those with a PhD, in theory are more trained in research activities and so would find it easier to conduct and publish research compared to those without, this also would explain them having the highest OSS, OCS and OPS, followed by masters and the UG graduates having the least score.

An important observation from the above results is that employing an academic with a PhD drastically increases the RP of the institution, whereas if they employ only academics with UG, then the institution's RP decreases by a huge margin. The institutions should consider this during recruiting of the academics and also while forcing the academics with UG to publish.

A major consideration must be the quality of the research that is being produced and the AD that is involved in conducting many PhDs. This will be explored in detail in the next sub-chapter (Chapter 5.2) that looks at the various forms of AD and how it influences the RP of the academics.

Having a degree abroad was not considered in this research, as none of the selected respondents had degrees from abroad, but Sahoo et al. (2017) reports that the RP of those who have a degree from abroad to have more RP than their counterparts. This requires further exploration.

5.1.13 Influence of the working hours and the % of duties on the academics' RP:

From Fig.30, it can be seen that academics who are contracted to work 7.5 to 8 hours a day are almost twice as productive in research as those who are working less than 6 hours per day. The graph shows two distinct regions, those who are working less than 7.5 hours a day having around 35-point score for their ORP and those who are working more than 7.5 hours per day having around 60 point score for their ORP. But there is only a very low positive correlation between the contracted hours and RP. Contracted hours and the EoRPs also showed no difference.

Teaching and research are seen as two different dimensions of academia by (Ramsden, 1994) who comments that teaching and research should not be seen as one, even though they might inform each other. Table 70 (See appendix 5), from the results chapter shows that RP is directly proportional to the time spent on research and inversely proportional to the time spent on teaching. Contradicting this result, the teaching related hours per week did not make any difference in their ORP and the different EoRP. This needs further exploration to identify any potential factors that might influence it.

One of the suggestions might be that the HEIs could allocate specific research time for the academics within their contracted working hours, which currently most of the institutions do not have. Also the faculty workload allocation should be based on if the academic is conducting a PhD or not, with those who are conducting a PhD or those who are research active to be allocated less teaching load. But the newly founded institutions and those institutions which are in survival mode depend on their academics to teach, do the admin work and also to recruit students, this would obviously impact on the RP of these academics.

From the interviews, it is evident that the HEIs and their managers expect that their academics conduct research in their own time and not or scarcely during the working hours at the institution. Whereas the academics comment that they need more time during the normal working hours to conduct research. This difference in the expectations between the academics and the managers might influence the RP and needs looking into with empirical data.

Especially in the newly founded institutions this is an issue as the academics are made responsible for a lot of administrative tasks and also for recruiting students through canvassing them, with a few institutions expecting the academics to go to the students' homes and to talk with the student's family. This is eating into their research time. As one of the respondents stated:

> *"Until a few years, if a staff recruits one student … the academic will be given a small monitory* (Financial) *incentive. But now … staff 'Should' recruit a certain number of students or else they do not get their salary for the summer vacation month! So now the staff go canvassing in peoples' homes looking for potential students and often exaggerating the facilities they have…."*

From the perspective of the HEIs wanting to improve their ranking - the new college ranking system (MHRD, 2016), includes research output when calculating the rank -

offering time for the academics to conduct research within their working day would increase their ORP, and the HEIs ranking.

5.1.14 An overview of the demographics' influence on RP:

Overall, it can be seen that the RP of the academics is low and demographics such as age group, position in the HEIs, teaching experience, pay scale, marital status, type and age of HEIs the academic is working in, time allocated for different duties, degrees working towards and working hours per day all influence ORP of the academics to varying degrees.

This research has found that there is no difference in the RP between demographic factors such as gender, industrial experience, working hours / day and residency from the campus. It is evident from Table 61 that academics who have scored zero for supervision, conferences and papers are mostly in junior positions, who are less than 35 years of age, less than 10 years of experience with a pay scale of less than 35K.month. It is worrying that these academics are not participating in research activities which is now considered as one of the most important elements for promotion and career progression.

5.1.15 Anticipated changes in the RP of different demographics:

The latest draft proposal by UGC (2018) to start to hire only PhD graduates for entry level positions will in the future change the demographics and RP of the academics. If the proposal is implemented, the RP of the future academics would look different to the results from this research. More junior staff members will have a PhD and papers published etc.

While this might look progressive, there are two very important concerns that should be taken into account. The salary of the academics in the future will have to increase as they will come in with a PhD, so how is it that the newly founded institutions which are already struggling to get students and are unable to pay their staff properly going to cope with this change?

Also, the draft proposal does not talk about the existence of AD and how to counteract it. Without a fundamental change in how AD and EoCI are being handled and sufficient research training incorporated into HEI policies, it could well create more AD and more jobs for the 'research consultancies'. This move will certainly create an increase in the quantity of research output, but how many of them will be junk papers and how many of them will be based on real data, making real contribution to knowledge would be questionable.

5.1.16 Combination of demographic levels and their influence on ORP:

Even after regression, the researcher wanted to see if any particular combinations of the demographic levels would have an influence on the ORP. This was done so as not to miss any opportunities that the data might provide. For instance, the researcher wanted to check if single male academic with a specific teaching experience had more ORP than a married male/female academic at a same/different teaching experience etc. To make it clear to the reader, 'Gender', 'Marital status' are demographic variables, whereas 'Male', 'Female' are the levels within 'Gender' and similarly, 'Single', 'Married', etc. are the levels in 'Marital status'.

From the available levels of the demographics, a total of 3,145,728,000 different combinations can be made (please note that the table is too long to include in the thesis). However, the researcher has focussed on the more obvious and important combinations. In addition, for the tests to be statistically significant for these many combinations there is an expectation that there be at least 15 responses for each of

the combinations (Blunch, 2012). This is not available with the current dataset, which only uses 307 useful responses. In addition, it is theoretically not possible to have an academic who is less than 25 years old who has more than 15 years of experience, so such combinations will result in zero responses. So, such combinations were avoided. Similarly, in the current data, there were no single academic at any levels higher than 45 years or more (See table 80 and fig. 60).

5.1.16.1 RP of genders of different age groups:

Prpic (2002) explores the interaction between the academics' age and gender influencing their ORP, commenting that young female academics have lower ORP than their counterparts. In this research, Fig.62 shows that both the genders have almost the same ORP when they are less than 25 years old, but male have a higher ORP from 25 to 35 years old. During this time, the researcher supposes that female academics undergo pregnancy and child rearing, thus reducing their ORP. There is a stark increase in the ORP of the female academics from 35 to 45 years old compared to male counterparts and that both the genders have similar ORP from 45 to 55 years old, with female academics having slightly higher ORP.

Even though Fig. 62 and 63 show considerable difference between the different genders at different age groups, statistically they were not significant. The reason being there are very few respondents older than 35 to 45 years old level (See table 23) and when they were split by gender, the numbers are still reduced (See table 81). When combined with other levels, they had high standard errors. In addition, the values for the 95% confidence interval for the lower and upper bound data showed a large range value. Table 83 shows the K-W test results that both male and female had the same RP in all their age groups. The researcher supposes that due to the lack of statistical significance is due to the limited number of responses. By increasing the number of responses to include more academics in the 35 years or older levels, it

might increase the significance. Even though in practice the population of the sample is reflective of the distribution of academics across the age group of the genders in Coimbatore, for statistical purposes, the number of respondents is not enough to make a significant prediction. With a high enough population, the results might be more significant.

5.1.16.3 RP of genders of different marital status:

It was decided to analyse if there were differences within the gender category, in terms of their marital status and how it affected their RP. Frequency distribution of the academics' marital status in table 23 shows that 56.7% of the respondents are married, it was decided to explore if the proportion of men and women have similar marital status or different and if that status influenced their RP. But rather than just looking at the proportion, K-W test was conducted (table 85) to see if marital status of male and female academics influenced their RP or not. Note that K-W test implicitly considers the proportion of the academics in terms of their marital status, so if there were any differences, K-W test will easily pick it up.

The influence of the interaction between gender and marital status does not show any differences in the RP between genders of the same marital status (see table 84), with the P-values showing no statistically significant difference between the genders of same marital status. Whereas, the RP differed between genders of differing marital status. This is seen from K-W test which shows that there is a difference in the research productivity between the genders of different marital status. Pairwise comparison between the different levels showed differences in the research productivity between single female and married male, and single male and married female, with married academics producing more research (fig.64) and that married academics are more research productive, regardless of gender.

5.1.16.4 Resilience of female academics:

It is interesting to observe (for several reasons) the variables 'Marital status' and 'Age group' not influencing the RP of the female academics compared their male counterparts. First of all, looking at it from a cultural perspective, in Indian society, there is an expectation that the females play a more active role in the family life, taking care of elders, child rearing etc. which from the literature (see: Kyvik and Teigen, 1996; Prpic, 2002; Hunter and Leahey, 2010) are seen to limit their RP. Also, their lack of collaboration and networking are commented to disadvantage them, but this result shows that even though they have these disadvantages, female academics have similar RP to that of male academics. It is surprising that they manage to keep their RP similar to that of their male counterparts even if they have these disadvantages.

The researcher speculates that female academics who are at 35 years or more have come through at least a few years of being in academia and have adjusted well to the conditions that prevail in it, making sure that they are able to balance both their family life and work/research life. Also, at 35 years or so, most of the female academics would have more time for research as their child rearing activities might be less compared to when they were younger. It would be very interesting to conduct an in-depth research into this looking at the differences between the genders in their approach to their work-life balance and how female academics manage to overcome the disadvantages and produce the same amount of research.

It is also interesting to note that being married does not seem to have any influence on the female academics producing less research compared to male academics. Understanding gender roles in India, it can be easily presumed that female academics might have less RP compared to male academics after marriage, but this is not the case.

More importantly, the results show a certain resilience in female academics having to overcome cultural expectations regarding the family obligations, having to go home early – limiting their access to laboratories and equipment and other disadvantages they have and still have the same RP as male despite their marital status or their age group. This is a very interesting and an important result.

The reason why marital status not affecting RP of the genders might be, as the researcher speculates, that women regardless of their marital status might still be in teaching /research roles whereas males might have progressed onto management roles, limiting their research opportunities.

Perhaps in the changing cultural context, the male family members share the house chores and family responsibilities proportionately higher than in the past. Or, perhaps when a married female academic is conducting research then, their spouse supports them more if they were not conducting research. But this is only a speculation, further data has to be collected to test this.

Unfortunately, the current data does not give any indication on the reason and the mechanisms for this resilience, and it needs further exploration. Initially the researcher had not considered this, but thanks to the internal reviewer's comments, this important result was seen. The researcher has started a new research exploring the same.

5.1.16.5 Culture, Research Productivity and female academics:

It is possible that female academics are putting cultural expectations about gender roles before their career success. One of the interviewees commented that women might delay their progress in research career and/or to start their PhD so as to secure a husband.

"…*Women prefer not to do a PhD before marriage as the husband likes to have a higher degree than the wife. The man however starts a PhD so that he gets a better arranged marriage"*

Linking this interview comment with the quantitative data, tests of differences were conducted to see if there any differences in when male and female academics choose to start their PhD. Mantel-Haenszel and Fisher's exact tests (see table 24) showed no difference between male and female academics on when they choose to start a PhD. This shows no compatibility between the quantitative and qualitative data. In addition, the available data in this research could not confirm or deny if women are more/less likely to have a PhD or start a PhD when they marry. The researcher could only speculate that this might be the case, but it needs to be tested in a future research. Further research should be conducted to explore this in detail, especially the future research should try to find the mechanisms through which cultural expectation of the gender influence their decision to start an academic career.

5.1.16.5 Future directions:

In the future, if the MHRD proposal of recruiting only those academics with PhD even for an entry level academic position gets approved, then, it will change (from the current scenario) on how RP is influenced by marital status, gender or the age group. This is because every academic will have a PhD and would have a couple of papers published (which is a necessity for a PhD in India). One very important consideration in terms of this proposal is that if it disadvantages female wanting to become academics or not. For instance, a female after masters (approx. age 23 to 24 yrs.) can become an academic currently, but with the MHRD proposal, it will take them an additional three to four years, at which time they might be married and might be in the

throes of family life and child rearing etc. which might disadvantage them compared to male academics.

5.1.15.6 Results of other demographic combinations with the RP:

The requirement for more responses is obvious from table 82 and fig. 61, which show the interaction between gender, marital status and the teaching experience. Even though in theory it might not be possible to have all the boxes filled in table 82 or in the full interaction table (too long to be included in the thesis), a greater number of responses distributed over the cells might be useful. This is a limitation of this sample and a future research with a non-random sampling could be conducted to ensure distribution of data across the cells.

Looking at the interaction of gender and teaching experience (Fig. 59 and table 79), again there was no statistically significant difference between the levels, but it was evident that for both the genders, the RP increased with their experience.

In addition, the results further combinations showed high standard errors that were very close to the mean values or that the standard errors were even higher than the mean values (Table too long to be included. Approx. 12 pages). The presence of such high standard errors shows very little statistical significance regarding the difference between the ORP. Similarly, OSS, OCS and OPS also showed little difference between the different demographic combinations. A future research may be considered where more responses can be collected which would allow such a deep analysis to identify any such differences. Currently, this research rather than relying on the differences in the demographic levels in different combinations, relies on the regression analysis which also considers both the individual and shared variance between the different levels of the demographics and also of the latent factors.

5.1.17 Conclusion:

This part of the discussion chapter has looked at the RP of the academics in Coimbatore's engineering HEIs and the various demographic differences and demographic influences on the RP of the academics, thus addressing the research questions 1 and 2. Research question 1 is partly answered by this as it looks at few of the important factors that influence the RP of the academics. It also answers the research question 2 fully as it measures the impact of various demographic factors on the ORP and the EoRP of the academics. The research also goes beyond measuring to what extent the demographic factors influence RP to that of qualitatively exploring the reasons how the demographics influence RP.

Since this is one of the first empirical studies to explore the influence of demographic attributes on the RP of the academics, it has made a contribution to knowledge. Especially as the literature did not reveal any such studies having been carried out in South India. This study uses both quantitative and qualitative data which has revealed not only the differences in the RP of various demographics, but also suggests the reasons for those differences. The governing bodies, institutions and the funding bodies can use the results of this work to see how various resources can be allocated to increase the research skills of the academics and consequently the RP of the institutions. This section of the discussions has also offered a lot of suggestions for the HEIs to improve their RP and their academics.

The intention of this section was not to identify the characteristics of a high RP scoring academic, but to give a picture of the demographic spread of academics in terms of their RP and how HEIs might allocate their resources to improve the RP of those with lower RP scores. The next section of the discussion chapter looks at the influence of AD, EoCI, and the CAE on the RP of the academics.

5.2 Discussions on the influence of AD, EoCIs and the changing academic environment on RP:

This section will look at how AD, EoCI and the CAE influence the Research Productivity (RP) of the academics and how these factors are interconnected. It will also look at the range of AD that happens at different levels in HE and suggests ways to overcome it.

Factor analysis identified six factors that influence the RP of the academics. They are: 1. Changing Academic Environment (CAE), 2. Academic Dishonesty (AD), 3. Indigenous factors / Elements of Cultural Identities (EoCI), 4. Colleague / research environment, 5. Personal factors and the 6. Absence of institutional support (Fig.34). WLS Regression was conducted to identify the factors that are significant for increasing the ORP. The results indicate that among the six identified factors, only AD and EoCI influenced ORP and the other four factors were not statistically significant. However, interviews emphasised the importance of CAE on ORP. It is surprising that factors such as institutional support, colleague / research environment which were identified as important in the literature were not shown to be significant from the quantitative results.

Corruption in HE is not only a problem for the developing countries, but also for the developed countries (Mohamedbhai, 2016). Looking at the developing countries, wanting to get into a prestigious institution, climbing the academic ladder quickly through publications etc. are seen to be the reasons for AD.

From the literature, it can be seen that very few papers have looked empirically at AD and EoCI in India and none of them have looked at how AD, EoCI influences the RP

of the academics. Also no paper has empirically looked at AD and EoCI in South India. This is one of the first pieces of research to explore this empirically. This lack of literature also limits comparing the results with other similar empirical studies. So, this section will discuss the influence of AD, EoCIs on the RP based on the quantitative and qualitative data.

The quantitative results show that AD is negatively associated with ORP and with OPS. Whereas EoCIs are positively associated with ORP, OSS, OCS and OPS.

5.2.1 Influence of AD on the research productivity of academics:

From the data it was evident that AD takes place at different levels of the academic system. This research looks at the AD at the academic / staff level, institutional / organisational level and within the governing bodies.

Initially the list of AD from the data will be presented and then the reasons for AD will be explored in detail. This will be followed by suggestions on how to combat AD.

5.2.1.1 AD at the academic level:

The interviews have shown much of AD takes place in the staff level.

"100% there is AD."

Was one of the respondent's statement in the interview and this opinion is echoed in all the interviews and also from the quantitative data. 72.2% of the academics agree or strongly agree that corruption has found its way into academic research and that 77.2% believe that academics are buying research rather than conducting it themselves.

The list of various AD at the academic / staff level in terms of RP based on the interviews include:

1. Paying money /bribe for getting the academic position.
2. Asking the PhD students to pay them for supervision,
3. Expecting money and material favours from the students,
4. Asking money from the students for signatures and for publishing papers,
5. The supervisor publishing a paper as a first author for the research that the student has paid for,
6. Paying a friend (in kind or in money) to be included as a co-author,
7. Outsourcing research to Masters students,
8. Encouraging the students to go to the agencies,
9. Buying research, buying papers and PhD thesis either fully or partly the research agencies/consultancies,
10. A few academics join and pay together to publish in a good quality journal and they claim points for this to either get a promotion or to get a pay rise,
11. Not paying the agencies the money they are owed,
12. Having links with the agencies and sending the students to the agency for a commission,
13. Manipulating the research results, creating their own (fake) data, plagiarism also outright copying and
14. Sending papers to more than one journal at the same time.

As a respondent from the agency stated:

"Most of academics who approach us just know the area that they want us to do research, like I want to do a PhD in thermodynamics, or in robotics etc. They have very weak mathematical and programming skills. They will ask us to do the whole thing: Derive the equation, programme it, create a model and test it. They are basically buying what we are doing."

Similar aspects of AD have been reported by Mohamedbhai (2016), Daniel (2016), Gopalakrishnan Saroja et al. (2016) and Sivasubramaniam et al. (2016).

5.2.1.2 AD at the institutional level:

As Marginson (2018) in his IIEP–UNESCO lecture points out, that the long list of the low quality higher education sector in India is a major problem to the development of the country. AD is one of the major issues influencing the low quality of the sector. At the Institutional level, the interviewees commented that the following examples of AD had been observed:

1. Recruiting, teaching and awarding degrees for more than the approved (by UGC or AICTE) number of students by the Deemed Universities,
2. Accepting 'Ghost' students who supposedly are full time students but appear only for exams. They are usually full-time workers at some other organisation,
3. Swapping of academics between sister institutions during inspections.
4. Paying/bribing the governing bodies for leniency in inspection, for getting accreditation, to not to bother about some of the malpractices that the institutions involve in,
5. Not paying the academics a proper salary but changing the figures and showing the inspecting bodies and the governing bodies that they pay the stipulated salary,
6. Having under-qualified lecturers and having lecturers who have just graduated their UG to cut cost on staff remuneration,
7. Not having proper facilities for the academics to conduct research, not encouraging the academics to conduct research but still demanding that they produce research for ranking purposes,
8. Not bothering about the quality of the research or if the research was conducted fairly and just wanting to show the quantity of research that has been produced,

9. Deceiving the inspection bodies by hiring certificates of Masters and PhD graduates just for inspection purposes and by creating fake time tables for those ‘ghost’ lecturers,
10. Not having the stipulated number of PhD holders and Masters graduates for lecturing,
11. This is not really a dishonesty but demanding the lecturers to recruit students for the institution and if they do not recruit a certain number, then they are not paid for their summer holiday,
12. Research not being a part of the agenda of the institution but still expecting the academics to produce research output and
13. Implicitly encouraging the staff to approach the agencies for research.

The interview data is supported by the various newspaper articles including TheHindu (2018), Srivastava (2017) and (Anandakrishnan, 2013).

5.2.1.3 AD at the governing bodies’ level:

72.5% of the academics ‘Agree or Strongly Agree’ (A/SA) that the governing bodies have little concern for the quality of research from the Affiliated institutions. 74.1% of the academics either A/SA that some of the engineering institutions in Coimbatore should not have been accredited at all. Also 65.7% of the academics A/SA about the ineffectiveness in counteracting the malpractices in the HEIs. These responses indicate a lack of confidence of the academics in the governing bodies and their working.

AD based at the governing body level included:

1. Getting bribe/money from the institutions during checks for turning a blind eye to the issues in the institutions, such as lack of facilities, infrastructure, staff etc.
2. Paying money to the concerned ministers to get a Vice Chancellor (VC) post.
3. Not inspecting the institutions properly in return for a bribe.

4. Getting money/bribe for accreditation of institutions.
5. Getting money/bribe for appointing of academics.

Not really a dishonesty, but the improper planning and allowing so many institutions to be founded and the number of seats to be increased without consideration for supply vs. demand.

5.2.1.4 AD at the societal level:

Corruption is not particular to academia but is an overflow into academia from the corruption that goes on in government offices and in general. The list of all the so called 'scams' and corruption is long, with the popular ones being, the 2G scam (GoI, 2012, TToI, 2012) coal scam (Srinivas, 2012, CaAGoI, 2012), fodder scam (Burns, 1997), disproportionate assert case (TheHindu, 2017, Panchu, 2017) to name a few. Along with these high-profile cases, there is the daily bribing of government officers and low level corruption seen everywhere.

AD is an overspill from how the Indian society works. When the society has accepted bribery, corruption and dishonesty as a part of the workings of everyday life which either the individual should safeguard themselves from or become part of it, it is difficult to overcome corruption in a particular field (academia) alone. This is supported by the statements from the interviews:

"Corruption that is prevalent in the society and within the management (which) sets up a bad example for the academics."

"…Let me tell you in one phrase "Be a Roman while in Rome". Alas, being a Roman here is being unethical."

In theory, the written codes and laws punishes corruption and dishonesty and the Indian culture deems it immoral. But as Rothstein (2017) comments there is a distinction between moral and the social norms. While moral norms talk of the

principles, social norms are the presumed social practice. People might believe that corruption or AD is morally wrong, but if that is the social norm/practice, what everyone else does, there is little point doing it otherwise. Since there is a distinction between ‘rules in written form’ and ‘rules in use or the standard operating procedure’, policies should be formed based on changing the rules in use and thus reducing corruption (Rothstein, 2017).

5.2.1.5 Reasons for AD:

Looking at the causes of corruption in general, Klitgaard et al. (2000) in their World Bank report comment that corruption ensues when people in power have much of discretion and monopoly with little accountability. The reasons for AD are many fold, which will be discussed and this section will look at the reasons for AD at all the three levels.

The main reasons for AD in this work was attributed to survival, promotion, lack of research skills and seeking pay rises at the academic level. Survival, moving up the ranking and money making at the institutional level. Money making, and improper planning was attributed to the AD at the governing body level.

5.2.1.5.1 AD at the academic level:

The lure of incentives and the pressure to publish pushes the academics with little research skill towards AD activities. This is supported by the works of Daniel (2016). When there is pressure to publish with limited research facilities and skills as commented by the respondents, then it is understandable that fake research and results emerge.

Reasons for AD as commented by the respondents include:

1. Pressure to publish,
2. Peer and social influence,
3. Promotion and to earn more money,
4. Lack of skills and
5. Survival and job security.

Pressure to publish was one of the major reasons suggested by the academics, managers and also the agencies. This is in line with the report by UNESCO's International Institute for Education Planning (IIEP) Eckstein (2003) who comment that pressure to publish as one of the reasons for the increase in plagiarism and other AD.

The interview data also shows that the existence of AD is due to the current societal system, in which corruption is seen as an everyday thing and that a honest academic changes when he/she sees a dishonest academic reaping the benefits of research (even if the research was falsified) and turns to dishonesty. This connects with peer behaviour which was identified as another reason for AD. As Rothstein (2017) comments, in a dishonest environment, people who see something as morally wrong may still take part in the practice as it might be seen as the social norm. If peers are involved in AD, then the academic who is honest is also influenced by it.

"They (academics) start with good thoughts. But compared to them, their colleagues who approach an agency publish quicker and more. This creates a sense of insecurity in the academic who is doing it properly. So, he asks the guy which agency he went to".
"For example, if I start PhD with another colleague, he publishes in paid journals and seeks the help of all these agencies and I don't, then he will hand in his thesis earlier and have a few publications in his name."

Earning more money is seen to be a major influence to conduct research to continue being an academic, to have a promotion and to have a higher salary. With one of the respondents stating that if research was not mandatory for promotion and higher salary, most of the academics would not conduct research. The quantitative data

results also show that promotion or career progression as one of the major reason the academics conduct research, with 92% of the respondents A/SA to the question.

"… most of them are only concerned with promotion and increment. If you tell them that there is no need to conduct research for getting promoted or for pay rise, very few will do research".

Lack of research skills in the academics was mentioned as a major reason to AD. The interviews report that the academics are not skilled enough in conducting research approach the agencies for either their PhD or for publications. This needs careful examination, because a dishonest academic might get their PhD or publish papers, but still they will not have increased their research skills.

"The academics have less knowledge about research. In most of the cases they don't have a clue about what to do and how to do it. All that they know is that they either have to finish some sort of a PhD or write some paper".

The lack of skills was commented by the agencies as one of the major contributors for AD. The interviews with the agencies point out the lack of programming skills, skills in statistical software, mathematical skills and an understanding of the application of engineering principles. This is a serious issue that should be explored in detail.

Similarly. Survival as an academic, i.e. being less likely to be fired by the institutions were reported to be a main reason for AD.

"It is just for survival that people do research, only 1 out of 100 do research out of passion, the others for mere survival…"

"Basically, it is (about) *survival now, academics do PhD so that they can survive being an academic and (so) that it is a bit difficult to be fired. ..."*

The above reasons for AD at the academic level mirror those given by the agencies, which include a lack of skills, pressure to publish and promotion. The agencies report that a lack of resources in the University employing the academic as another reason

for AD. Lack of research laboratories, materials for conducting research, software and literature that the academics can access are the other reasons for AD.

The results show a very interesting characteristic when looked at from the perspective of 'Needs theory'. The data shows that the academics are conducting research, publishing (a higher-order need) mostly for survival as an academic (a lower-order need). From Maslow's theory, a person is motivated to achieve a higher-order need after the lower level need is satisfied, whereas in the current Indian academic environment, the academics work on a higher-order element to satisfy a lower order need. How motivating such a scenario might be for the academics to conduct research is questionable.

Looking at it from the two-factor theory, this issue is even more obvious, as what the academics are working towards (PhD, publications etc.) are essentially in the 'motivator' part of the spectrum, whereas the reward that they will get for that (Job security, survival as an academic) are in the hygiene end of the spectrum. The researcher speculates that this mismatch between what the academics do and why they do, combined with their limited research skills and opportunities to conduct research as a cause for AD. Further research should be conducted to explore this in detail, so as to understand the academics' perception of this mismatch and the mechanisms they employ to accommodate/eliminate this situation.

Linking the results with the theories of creativity, Shalley (1995) Comments that when quantitative output is the major target, then the creativity of both the individual and the team suffers. In the current Indian research scenario with the new MHRD ranking system, the Institutions are focused more on enhancing their research productivity in terms of quantity. Thus, limiting the creativity of both the research teams and that of the academics, and favouring quick quantity of publications over quality research and publications that might take longer. Especially, with the limited resource availability and limited support from the institutions, it would be difficult for the academics to produce quality and creative research. This requires further exploration.

It also raises the question if the academics publish in paid journals are aware that they are publishing in a low quality, exploitative, non-peer-reviewed journals and the whole negative picture? The researcher speculates that they are aware of what they do and tend to ignore them for quick and easy publication. This is supported by

Gopalakrishnan et al. (2016) who comment that most of the authors make an informed choice to publish in them. Linking it with the expectancy theory by Vroom (1964), who comments that a person evaluates all the possible causes and consequences and chooses the course of action that lead to his/her valued outcomes, in this case publications.

5.2.1.5.2 Reasons for AD at the supervision level:

The interview data reports a variety of AD of the supervisors, these include getting money from their PhD students for supervising them, expecting favours from them and also sending their students to the agencies where they have an agreement to share money.

Two more of the reasons that came out include money making by the supervisors and also the lack of skills by the supervisor to supervise their students. One of the respondent commented that if the supervisor himself had 'bought' the thesis from an agency, then he/she will lack the research skills and when he is supervising a student, he/she would try to recover the cost they paid for their own thesis from their students. This would also result in them sending their students to the agencies.

5.2.1.5.3 Reasons for AD at the institutional level:

The reason for AD is often the greed of the owners of the HEIs (71.9% of the academics A/SA that institutions have become a money making machines, that there is improper planning by the governing bodies and society which as accepted corruption. The decrease in demand for engineering studies from the graduates has created much of the issues such as reduced number of students enrolling, competing for students through middle men, having 'Ghost students' (Who come only for exam) etc. This also means that the institutions take on anyone applying to study as long as

they have passed their ‘A-levels’ with the minimum grade and are able to pay fees. This is reducing the quality of the students who are enrolled in many institutions. This is reflected in the quantitative results where 87.3% of the respondents either A/SA that the quality of the students entering engineering institutions has dropped.

Daniel (2016) comments that academia has become a business, a money-making commercial enterprise. But it is seen from the results that research has also become a commercial activity that is being sold and bought. It is not being bought for pride but is bought for survival and for promotion. Politicians and their binami (A third party who holds a property ostensible for a different principle or beneficiary owner) owning HEIs was also commented as being a reason for AD at the institutional level.

The concept of ‘Ghost’ lecturers who appear only during inspections is very surprising to even think of. The certificates of masters or PhD graduates being hired is also reported.

5.2.1.5.4 Reasons for AD at the Governing body level:

The data did not reveal as much information about the reasons for AD at the governing body level as in the other two levels. The major reasons were reported to be money making by the officials in the high positions. The major reason for limited data at this level might be because this research has not collected data from individuals working at this level. Future research can explore this in detail.

The perception the academics have of the governing bodies does not show confidence in them. Corruption in granting approval for founding and expansion of institutions and in getting a Deemed University status are seen to be widespread, in particular approval and accreditation of the private colleges is a lucrative money making activity for those in power.

"The governing bodies get money (dishonestly / bribe) for accrediting a particular institution. They are also usually taken care of by the institutions when they come for an inspection".

"The governing bodies gives accreditation to an institution even if they know that the facilities in there are not very good, of course they will be paid a lot of money for this"

5.2.1.6 Contribution of Research consultancies / agencies towards AD:

All of the interviews with the academics and managers pointed out the existence of the agencies where academics can buy papers or theses. The presence of such agencies popularly called 'paper mills' are reported by Sivasubramaniam et al. (2016) and Eckstein (2003). With Eckstein (2003) commenting that the agencies advertise themselves as 'consultants', or 'editorial assistance', but actually they sell commercial papers and theses.

Most of the research produced by the agencies are not genuine. The interviews with the agencies gave an insight into how they produce research, with the agencies modifying existing data or outright faking it. It results in no genuine research or in useful results that addresses the gaps in literature or improve the field of research. The papers and the theses based on them are not useful to the scientific community. As a respondent commented: such research papers just becomes another junk paper.

"…Who collects real data? I would definitely say that 95% of the data 'collected' by the agencies are just made up values depending on what the researcher wants the results to be".
"Mostly the entire data for analysis will be downloaded from the internet, because it is not possible to create all these data out of the blue…"

The respondents from the agencies commented that they have grown as a result of academics wanting a quick promotion or pay rise and because of unsupportive supervisors and lack of research skills of the academics. The agencies employ graduates with UG or PG to 'conduct' PhD level research work. This researcher assumes that if UG and PG graduates can be trained to conduct PhD level research,

even the academics who are working towards a PhD or writing a paper can be trained in research. Discussion on training will be discussed in more detail in the introspection section in appendix 1.

The sophistication of the agencies is growing, with them using plagiarism software such as Turnitin and commenting that the work they produce is less than 7% plagiarised, i.e. below the allowed limit. This result is supported by Sivasubramaniam et al. (2016) who conducted interviews with such agencies (note that the authors do not mention the country of the study).

The interviews show that the agencies were all well aware that they are involved in AD and that they were doing unethical things, but they see it as a business. They chose to ignore the consequences for financial reasons. The works of Sivasubramaniam et al. (2016) and Walker and Townley (2012) supports the findings.

"The agencies are just concerned with money and do not care about AD, or any EoCIs etc. (According) *to them* (the agencies)*, they are giving a service to a problem an academic has. Initially they will have a discussion, and if you* (the academics) *are happy with the discussion, pay the advance, when it is done, pay the rest of the money for delivery. Here is no feeling or thought of academic honesty or dishonesty"*
"You are asking if we are cheating. Well, in a way everyone is. Such agencies did not emerge out of nowhere. They have come up because of the system that the current academic system operates in".

The consequences of using agencies include no real research being conducted and even worse, some of this fake research might get published in quality journals, even cited or perhaps even used for forming further experiments or policies. Such work is misleading and can be dangerous if implemented. This also decreases the confidence of various governing and policy making bodies in the research that is being published. The authors employing the agencies and the agencies themselves just look at what they do, but it is important that all the actors see the big picture and how their small part influences research as a whole.

5.2.1.7 The complex nature of AD:

In order to reduce AD, it becomes essential to understand its' complex nature. One of the reasons for the shortage of papers investigating systematic corruption is that such research is difficult to undertake (Welch, 2017). Also Tierney and Sabharwal (2017) report that even though the academic stakeholders are aware of the existence of corruption, there is little they can do about it. This points to the complex nature of AD.

AD is not a binary objective element (i.e. yes or no), but as can be seen from the data is a spectrum with various levels, starting from just not revealing the entire data set, to that of outsourcing / buying the research completely or stealing someone else's work. Where the academic chooses to be along the spectrum and what they consider normal appears to depend on several factors:

1. The personal ethical standing of the academic,
2. The academic surroundings/environment,
3. The cultural elements,
4. Time management and
5. Research skills.

But there is also AD at the institutional and governing body level and in society on the whole. There are many factors that are all interconnected with each other as reported by NewIndianXpress (2018b), Daniel (2016), Aaron (2016), Anandakrishnan (2013) and Eckstein (2003).

An example of the links can be seen as: The VC bribes the ministers to get the post and in turn recovers the money they paid (bribed) by getting bribes from various

Affiliated institutions under them and the various staff postings under them, from cheating on purchases, office renovations, construction of buildings, producing fake bills, commission from contractors etc. (NewIndianXpress, 2018b, Anandakrishnan, 2013).

They further comment that the education minister may even delay postings to the aided HEIs until the college management pays them a bribe. The college management gets the money from the academics who are appointed, who in turn indulge in dishonest activities such as extracting a considerable amount of money from their PhD students for supervision, approval of the thesis etc. There have also been cases where sexual favours are expected. This creates a spiralling down of the system.

Linking all these results with the learned needs theory McClelland et al. (1976a), if the academics, supervisors, institutions and the Governing bodies learn from their environment and their previous experiences on using various dishonest means as a shortcut to quickly publish, get a promotion, get accreditation, get through inspection and so on, then such type of behaviour might easily creep into their motivation system. From the data, it can be seen that to a considerable extent this is the case in the current academic environment, where the different actors (academics, institutions, Governing bodies) learn about the ease with which they can achieve their goals using AD. They do this by looking and learning from their peers who are involved in such practices, especially when they learn that this is the social norm, then even if their moral norms are different, the actors usually tend to comply with the practices of their immediate environment. This is also seen from the following quotation:

"If once my dishonest paper gets published, from the next time onwards, I won't be bothered to work very hard for publishing, because conducting research is an arduous task so why to suffer, when you can do it the easy way?"

A separate study on the AD at various levels could be conducted that will give an in depth view of the relations between them.

5.2.1.8 Reducing AD:

From the various results, it is clear that AD exists and this section looks at a few strategies to reduce AD at different levels.

Poisson (2010) comments that one of the major reasons for the educational sector not to have tackled corruption or to publicly acknowledge it and or even do proper research on it is due to a fear of tarnishing the image of the educational system and as a consequence getting reduced funding. Similarly, Daniel (2016) comments that the HEIs, governments, societies are too complacent about the growth of corrupt practices and turning a blind eye to it. He adds that a considerable courage is required for academics and the leaders of the HEIs to accept and to tackle malpractices in the HES.

The same might apply to India, where the existence of very little empirical research in this area points to a lack of acknowledgement of AD in the HES. It must be noted that this is the first empirical research exploring the influence of various AD on the RP of academics in South India.

Reducing AD should be seen at all the three levels

5.2.1.8.1 Reducing AD at the academic / staff level:

The recruitment of the academics should be based on merit and not asking everyone to conduct research especially in the newly founded institutions where they have little research facilities were commented by the respondents. Daniel (2016) recommends that publishing and implementing clear codes of ethics for research and punishing those who do not adhere to it as a way to reduce AD in terms of buying research, fabrication of data and results etc.

Reducing the salary difference between Masters and PhD graduates was suggested in the interviews as it will reduce the lure to buy research just to get more salary. Another respondent commented that if the Dean of research is an ethical person, AD might reduce. The researcher supposes that this is an extension of 'the importance of a role model' that the respondent is talking about.

At the institutional level, a long-term suggestion was that the teaching methods could be changed in which rather than simply focusing on finishing the syllabus, the academics should make sure that the students understand the applications of what they learn. So that when these students become academics, they have more skills (applications of the engineering concepts, programming etc.) which the agencies commented that the current academics do not have.

In the short term, improving the research skills and training the academics in research were commented by the respondents as a major way to reduce AD.

5.8.1.8.2 Training academics in research as a suggestion to reduce AD:

This research suggests that the academics should be trained in research before they start conducting their own. This would be an effective way to help reduce AD at the academic level and to helping their staff to improve their skills.

The data suggests that not having skills to conduct research properly, not being interested in research, and the unavailability of proper guides as some major reasons for indulging in AD.

"When people must do something (research) *that they are not trained for under the pretext of job security, AD will prevail. The more the management pressurises,* (the) *more AD* (there) *would be. It has become a job security issue now, thanks to the ranking system."*

This is supported by the following comments:

"It is very difficult for the new institutions to get any benefit out of this (Ranking system), they do not have money and would be reluctant to recruit good quality staff with reputed publications due to salary issues, and so it is very difficult for them to improve their ranking. It will take them a long time for them to even think of it."

Linking the results with Field theory of motivation by Lewin (1951), the psychological distance between the goal and person inversely affects their motivation. This means that when the academic has little research skills, or if they are not confident enough in their research skills and in using research tools, then they will lack motivation to conduct proper research and from the data, it can be seen that the academics bridge this gap through shortcuts as the several AD listed.

According to Herzberg's Job Enrichment Theory (Herzberg, 1959), an individual is motivated when he is given the opportunity to express his ability. Thus, it can be seen from the field theory and Herzberg's theory of motivation, that by providing training to the academics in research, it increases their ability to conduct research, thus would reduce them having to approach the agencies.

Draper et al. (2017) comments on using legal means to combat the agencies' and calls for the law to create a new offense to tackle them as the current laws are not effective. Putting in more policing was also suggested by respondents in the interviews, but this research advocates that rather than putting in policing mechanisms, increasing academics' skills should would be more constructive. A few suggestions from the researcher regarding training can be seen in Appendix 1.

5.2.1.9 Reducing AD at the institutional level:

From Table 57 and the interviews it can be seen that AD negatively influences the RP, both in its quantity (from the quantitative result) and the quality (from the interviews), so to increase the RP of academics, the institutions should try to change the perception of the academics about the academic system. They can do this by being more

transparent, being driven by social and moral concerns and by providing training for the academics in research.

Encouraging those academics who are interested in conducting research and not by forcing all the academics to publish was commented on in the interviews. Also that the selection and promotion of academics be based on the quality, not the quantity of their publications.

As Hallak and Poisson (2007) suggest good practices should be rewarded and care be taken that distorted practices do not receive incentives. This was also reported in the interviews in which an honest academic looking at his peers involved in AD is influenced by them getting the rewards of research. Equity theory of motivation (Adams, 1963) helps explains this, in which the honest academics feel a sense of injustice or inequity between them and their immediate peers and academics from other institutions which would either demotivate them or drive them to be involved in AD as well. This will happen especially if the system rewards a dishonest academic. Thus, the equity theory and the social comparison theory serves as a bridge between the theories of motivation and the discussion on understanding and reducing AD. This is also discussed in the section on introspection in appendix 1.

Also suggested were improving the skills of the academics in terms of the writing skills, research skills: collecting data, designing research, analysing the data etc., the academics to be paid proper salary according to the norms, taking off the pressure to recruit students (with the threat of not being paid for a month) by the academics so that they can focus on research. When the

Appointing of staff at academic level and at a managerial level transparently and by excluding conflicts of interest as Daniel (2016) reports that AD can be reduced. He

also suggests that creating an internal quality framework through wide consultations might help reduce the promotion of staff based on bribe.

The data does not offer any suggestions to overcome issues at the institutional level such as hiring certificates of the PG and PhD graduates just for inspection, not having the stipulated number of the types of academics, bribing the inspectors and hiring ghost lecturers etc.

5.2.1.9.1 Suggestions on using technology to reduce AD at institutional level:

Poisson (2010) recommends increasing the transparency in the sector, strengthening institutional and individual capacities in accounting, expenditure tracking, production and publication of information and use of technology etc. to reduce corruption. This section offers a technological suggestion on how technology can be used to reduce the problem of 'ghost lecturing'.

The Indian Government has now introduced the 'Aadhar card' (A biometric citizen card. Similar to NI number in the UK, but is biometric) as a mandatory requirement for almost every bank account opening, getting a job, transactions, get pensions, even to buy a SIM card, etc (Sawant, 2017, Khera, 2017). If the governing bodies could create a centralised registration page for academics based on the Aadhar card, maintained by the Government where it is mandatory that every college register and regularly update their staff list, then the governing bodies who inspect the institutions can cross verify the names of the academics. Also, such a central repository can be easily used to identify duplications and mismanagement. This will increase the transparency of the system and reduce the problem of ghost lecturers. However Khera (2017) criticises Aadhar as for not having reduced corruption and he further comments that it has become a tool for exclusion rather than creating an inclusive environment.

Also digital payments to the staff members and online transactions of their salary will reduce the dishonesty of the institutions who are not paying the staff members the stipulated salary that should be paid. (Though not revealed in the data, the researcher has heard of HEIs which transfer the proper salary to the academics' bank accounts and ask them to sign cheques so that the institution can withdraw some of it. Since the data did not indicate this, no further discussions are made). Abraham et al. (2017) call for more research to be done on effectively using Aadhar card.

5.2.1.10 Reducing AD at the governing bodies' level:

There was limited data from the respondents on this. This may be because they are not very much exposed to the AD at the top level. Pliksnys et al. (2009) in their IIEP-UNESCO report comment that the lack of transparency, loss of trust in the governing institutions and improper funding mechanism, result in corruption. So, in order to reduce corruption, (in case of AD), an increase of transparency in the functioning and handling of the various governing bodies would be a start. Similarly (Daniel, 2016) in his UNESCO advisory statement recommends that the quality assurance bodies should look in detail on the malpractices.

Tierney and Sabharwal (2016) comment that the inspecting bodies are often paid around 10 times the actual fee for them to be lenient. Tierney and Sabharwal (2017) also point out the 'under-table' dealings of the institutions with the different bodies right from getting the initial permission to start the institution. These researches mirror the results of this research.

Daniel (2016) recommends that by ensuring proper procedures are followed during licensing, granting the power to award degrees and for accreditation of HEIs, AD can be reduced. However the usefulness of formal bodies in tackling corruption, as

Rothstein (2017) comments, is overrated. For instance, he points out that Uganda's formal anti-corruption bodies score 99/100 points on the think-think Global integrity index, but Uganda remains one of the most outwardly corrupt nations of the world.

The suggestions from the literature included use of technology, computerising and digitising the records for monitoring, analysing and checking transparency. Designing ethical codes and standards of conduct for academics and making them explicit to be followed is an important step (Daniel, 2016, Poisson, 2010). The respondents in the interviews commented that the governing bodies can create rules so that the academics publish only in free journals and that the publications in paid journals will not being counted towards their RP. This is also a recommendation by Daniel (2016) This will not only reduce the academics paying 'predatory journals' as reported by Gopalakrishnan Saroja et al. (2016), but also would considerably reduce the number of predatory journals.

Such measures might definitely reduce the quantity of the research produced in the institution in the short term, but it will give time for building a strong foundation on which future research, true research can be based. A long-term vision should be adopted by the institutions and the governing bodies.

Punishments for academics involved in AD was also suggested. The emphasis was again that AD is something very difficult to eradicate as it is just a reflection of the way the society operates. The other suggestions included that the institutions focus on long term goals and development rather than being short sighted.

This is supported by a respondent who commented:

"The management should form a long-term plan to increase the research and (it) should not be seen as something that can be done in a short time."

5.2.1.11 Education against corruption:

Corruption as UNESCO (2000) comments is a major drain on the effective use of resources for education and it needs to be reduced /eliminated. One of the suggestions found in the literature is to use education as a tool to counteract corruption and AD. Tirana (2012) comments that educational policies against corruption should start at school level itself. This is supported by UNESCO'S IBE report (Hughes and Acedo, 2014) that 21st century education should go beyond just imparting skills and technology and should start fostering academic honesty, integrity, social, psychological and moral development of the students as a means of creating a quality education system.

To counteract corruption (AD is a part of it), Pliksnys et al. (2009) recommends that ethics and anti-corruption education should be provided at different levels, starting with the general public and school students who will be the future civil servants and also to the current civil servants. They also recommend that at HE level, anti-corruption education can be targeted according to the specialisation of the course the students have chosen.

Nonis and Swift (2001) and Sims (1993) point out the high correlation between those who were dishonest in schools and those being dishonest in workplace, with those students who were severely dishonest in school engaging in severely dishonest behaviour in workplace. So, the future school curriculum could incorporate elements to combat corruption.

This research cannot comment on the effectiveness of such practices as it does not have the relevant data. This needs further exploration and a longitudinal study seems appropriate.

5.2.2 Influence of EoCIs on the research productivity of academics:

India, even though is a rapidly developing country, is still conservative. The data shows that the Elements of Cultural Identities (EoCI) are positively correlated with the RP of the academics.

The quantitative results show the importance of EoCI for conducting research. For instance, 77.8% of the academics A/SA that they consider that it as a moral duty to conduct research, 84.3% A/SA that being of service to others is a strong motivator to conduct research, 83.5% A/SA that they want to be a role model to the society, 82.7% A/SA that the psychological satisfaction they get out of research motivates them. Even more interesting is when 81.8% of the academics A/SA that they consider doing research as a God given duty and 79.3% A/SA that it is because of God's grace they have achieved so far.

EoCIs are seen to be a very personal factors and to be comprised of internal motivators (i.e. wanting to be a role model, moral duty, psychological satisfaction etc.). EoCI was commented to be influencing an individual's mind-set on how to conduct research. Academics did agree that EoCI are important but, in contrast to their answers on AD, they did not give a detailed view of how EoCI influences RP.

"The cultural factors you have asked are very important, this is where we come from, this is our background – so I am sure it will have an impact on how people see and do their research".

"In simple terms, EoCI influences the attitude of the academics wanting to do proper research not the RP itself, which is a by-product of that attitude …".

One surprising result is that only 23.1% of the academics either A/SA that they consider 'Astrology', 'Auspicious time', 'Vaastu Saatram' are important whilst making research decisions. Even though it is very common and culturally ingrained in the society to follow these, the result does not mirror it. The researcher supposes that the

academics do not consider it important or that simply they did not want to reveal their beliefs, as it can be considered unscientific.

Based on (Hofstede, 1984), India scores high in 'power distance' compared to many Western countries. This is one instance where the cultural element negatively influences RP. From the interviews, the power distances between research supervisors and their students and between the principal and the academics were identified as a cultural aspect which influences the RP of the academics negatively. This has resulted in the academics who are conducting research not being comfortable asking questions of their supervisors, and consequently engaging in AD by approaching the agencies. The power distance is evident in the following comments of the respondents:

"The power distance between the supervisors and students is even miles wide when an academic is pursuing his PhD."

One important observation was that the academics viewed EoCI and AD as incompatible, with EoCI having a positive influence on RP and the quality of the RP. This is an interesting result, suggesting that the institutions or the governing bodies could use EoCI as a means to combat AD.

"… when people think that EoCIs are important, then they are ethical, if not then they are not ethical".

"EoCI does not affect RP directly, but it affects how the academics do research. I would not say that people who have high score for EoCI have more or less publications or something… but those who think that it (EoCI) is important, will do proper research".

Separate research should be conducted focussing specifically on the influence of EoCI on the RP of the academics, unlike it being considered as one of the elements as in this research. Also research could be conducted to understand how to form policies to reduce AD, include EoCI such as 'punniyam', 'God given duty', 'moral duty' etc., so as to reduce AD. While this data does not give very much information on the incorporation

of EoCI in policy formation, it does however suggest that being a role model is an EoCI that is seen to be important. This can be seen from comments such as:

"Mostly 'Being a role model' is the most important factor, when the academics think … that I will be a role model to others, then they will conduct good research".

"Having a role model and wanting to be one is very important..."

"You get influenced by those who you see around you. Especially in India, where people take their seniors/ elders as role model by default (Which is one of the elements of the culture of the nation), then it is easy to become like them – ethical or unethical in research".

The institutions can start promoting positive role models in research who conduct proper research and publish in free journals by encouraging and showcasing them.

Even though it is an institutional factor, creating an ethical research environment, that appreciates and rewards ethical research behaviour, could be created to reduce AD.

5.2.3 Influence of the Changing Academic Environment (CAE) on the research productivity of academics:

The Changing Academic Environment (CAE) included the rapid increase in the number of institutions and seats, the new MHRD ranking system the government has introduced, the significant increase in the workload and the academics having to take on more and more paperwork. The questionnaires revealed that 87% of the respondents SA/A about the increase in work load and 88.9% of the academics SA/A that they have to take on more administrative / paperwork. 87% SA/A that the quality of the students has dropped considerably.

The HEIs being allowed to take more than one or two batches of students per year / discipline (eg. Mechanical Engineering) was attributed to many of the struggles faced particularly by the newly founded institutions.

A research focussed on the relationship between the desire to fill seats in the institutions and the RP of their academics could be conducted. It can be hypothesised that there might be a strong association between the both, but it should be empirically tested.

The interviewees support these data commenting that since the newly founded HEIs are struggling to fill their seats they take on anyone with a pass grade and this would account for the lowering of the student quality. This is a major change in the academic environment, where it was difficult to get into an engineering institution to now the seats being vacant.

The lower quality of students means that both the academic and the student finds it difficult to teach and learn. Also, now due to the pressures for increasing the pass percentage, the institutions urge their academics to work longer and to conduct more class tests and monthly tests. This means that the academic along with having to teach and to conduct research, also has to prepare for the monthly tests and to mark the papers. As an academic commented that if there are fifty students in a class room and if an academic lectures five subjects that semester, then every month, s/he will have to mark 300 papers. This adds to their workload and negatively influence their RP.
Pass percentage is one of the important criteria for the local rankings of HEIs, and the academics are expected to have very high pass percentages. To do this, the academics would have to work harder, in the newly founded institutions with added pressures which would negatively affect their RP. Also, that in these institutions the academics are expected to take on additional administrative duties which would further hinder their RP. This requires further examination and a future research could look exclusively on the CAE and quantify the effects of the CAE on the academics' RP.

5.2.4 Interconnection between AD, EoCI and CAE and their influence on RP:

The CAE, EoCI and AD might appear to be very different things, however they are all interconnected with each other. The increasing number of institutions and the rapidly increasing number of seats available in the last few years is one of the biggest changes in the HES in South India. This already is seen from the data to relate to AD. For example, in getting permission, affiliation and accreditation from the various governing bodies. The data also suggests that there was an unplanned increase in the number of institutions and that explosion should have been better managed.

Due to the increasing number of institutions / seats available, the newly founded institutions do not have enough student intake to be able to run / fund themselves and to pay their staff properly. These institutions struggle to survive and start involving in various AD to cut costs. AD at the institutional level is discussed in section 5.2.1.2 and includes paying the staff less than they are supposed to, recruiting under qualified staff and having 'ghost lecturers' during times of inspection. Again, during the inspection, there is bribing of the inspection bodies to cover the deficiencies. Also, since these institutions are struggling to survive, they are unable to invest in the facilities that are required for academic research. Even in the more established institutions similar issues exist, except that they are not struggling to survive.

The academics in the more recent institutions, when they are expected to conduct research for improving the ranking of the institution (based on the MHRD ranking system), go to the agencies to partially or fully buy research. The agencies write papers / thesis with fake data. A share of the agency's fees might also go to the supervisor of the academic who is conducting his PhD. Similarly, to get papers published quicker, they publish in predatory journals which are not bothered about the quality of the research.

All the above individually and collectively influences negatively on the RP of the academics. The quantity of the research might see an increase, but the quality of the research goes down.

Another important link is how EoCIs and AD are related. The literature available pointed only identified a link between the academic and institutional level. The data from this research suggests that when an academic who is motivated by EoCI, see his peers getting published and finishing their thesis in dishonest ways, they change their perspective and get involved in AD as well. Ideally, EoCI should influence AD negatively, but the opposite is reported in which AD influenced EoCI negatively.

5.2.5 Future directions:

The first step to reduce AD are to acknowledge its existence in academia and then to try and formulate policies to reduce it. HE policies formed in the institutions and of the governing body level should incorporate practices that takes into consideration AD and EoCI and the results from this research such as the research training needs of the academics, reducing the incentives for dishonest research and to encouraging proper research work.

Currently, the newly founded institutions which have low student intakes, underpaid academics and no research focus and poor facilities expect their academics to publish and increase the ranking in order to get more students next year. One way to increase the long-term RP of the HEIs might be by exempting newly founded institutions from research in their first four or five years to give them time to start building a research base and then for them to enter the ranking system.

Proper planning when increasing the number of institutions and the seats available could eliminate a number of issues in the HES, such as the newly founded institutions

having sufficient students for their survival. With this, they would be able to pay their staff properly and be able to recruit high calibre staff increase their RP. Comparing it with Herzberg's theory, it would enable the institutions and their staff to fulfil their hygiene needs and to look at the motivating factors.

The institutions could create an ethical environment in which the culture and norm of viewing AD as a common element in academia should change. This would initiate a culture in which AD would be frowned up on. The policies formed should motivate the academics' pride in not getting involved in AD. By creating role models in the institutions (an EoCI) and by showcasing and appreciating them – it might be possible to reduce AD.

5.2.6 Influence of Personal Factors on the EoRP:

The Tobit regression between the six identified factors, dummies and the OCS, OPS and OSS show that personal factors influence both Overall Conference Scores (OCS) and Overall Paper Scores (OPS). When the academics perceive that personal factors are important, then they have higher OCS and OPS, even though personal factors were not identified as being important for ORP.

The personal factors are composed of elements such as 'interest in research', 'enjoying conducting research', 'career progression', 'confidence in research tools' and 'curiosity'. From the quantitative results, 95.1% of the respondents A/SA to curiosity being a driving force for them to conduct research and 85.7% of them A/SA that conducting research is enjoyable for them. Also, around 90% of the respondents A/SA about the importance of having a real interest in the research, about their confidence in using research tools and that they are conducting research for career progression. This shows the importance of personal factors for OCS and OPS.

The interviews with the academics and the agencies strongly support that most academics conduct research as they are after career progression, which is also associated with a higher salary and the other benefits associated with progressing to the next career level.

"…If you tell them that there is no need to conduct research for getting promoted or for pay rise, very few will do research".

"…he (Academics in general) is doing research just for the sake of numbers, for finishing his PhD, for promotion etc."

It is expected that most employees want to progress in their career. When conducting research and publishing has been made an essential criteria for promotion (NIRF, 2015) then in order to progress the academics will be forced to conduct research.

Linking this result with the two factor theory, career progression is identified by Herzberg (1959) as an intrinsic motivator and making research a mandatory element for an intrinsic factor such as this should help increase RP. In theory, this is good, as Kuvaas et al. (2017) report a positive association between intrinsic motivation of employees and positive outcomes, whereas extrinsic motivation was unrelated or negatively related to positive outcomes.

However, this needs further exploration as the interviews show a different picture suggesting that the academics are generally only interested in money making and consider research as a necessary evil for survival as an academic.

"It is just for survival that people do research, only 1 out of 100 do research out of passion, the others for mere survival…"

Similarly, the results relating to the academics being confident with using research tools, curiosity, interest and enjoyment in conducting research also need further exploration because the qualitative results are very different to the quantitative results

in this research. In particular, about the academics being confident in using the research tools is very different to the interview results.

This tendency of the academics to conduct research so that they cannot be fired from the institution is akin to what Atkinson calls as the tendency to avoid failure in his achievement motive theory (Atkinson, 1957). It looks like the academics are conducting research so as to avoid failure, but this question was not explicitly asked during the interview or in the questionnaires. It can be speculated that the tendency to avoid failure is about achieving the hygiene part of the spectrum, whereas the tendency to want to succeed is more of the motivation part of the spectrum as can be seen from the two-factor theory (Herzberg, 1959). Further research should be conducted to explore this in detail both from a theoretical and an application-oriented perspective.

The Goal Setting Theory (Locke and Latham, 1994) Comments that when the goal is too difficult to achieve then the motivation of the actor drops. Currently from the results it is evident that the academics lack research skills to conduct research and also there is little institutional support that is available for them, making the goal of conducting research considerably difficult for them. Especially with the recent pressure to conduct and publish research and with the lack of research skills and training, it might become more challenging for them to conduct research. The theory also suggests that goals that are moderately difficult and that could be explicitly seen and measured would motivate the actors more compared to those goals which are abstract and either too easy or too difficult. So, this research suggests that the institutions invest in increasing the research skills of the academics by providing them with research training and opportunities for collaborative research thus making the very difficult goal of conducting research into a relatively moderately difficult goal. This would enhance their academic challenge and enhance their research productivity.

Goal setting theory also emphasises the necessity for long term goals rather than short sighted goals. Also based on cultural dimensions Hofstede (1984), India rank higher in terms of long term orientation compared to Western countries, but the data clearly shows that the Institutions are much more oriented towards short term monetary benefit rather than investing resources and to create long-term development plans. But it can be understood from the perspective of the newly founded Institutions which

are struggling to survive. It would be very difficult for these institutions to form a long-term research and development plan.

Self-Determination Theory (SDT) (Ryan and Deci, 2000) comments that people have a deeply inherent tendency towards psychological growth and to achieve their inherent needs. But it is not very clear from the data what these inherent needs are. The data suggests that few of the internal motivators include wanting to be of service to the society and wanting to be your role model and that these influences positively their research productivity, confirming with the results of SDT. However, the interview suggests that the academics are motivated by external factors such as pay rise, promotion, job security and wanting to earn more money. The theory also suggest that a person feels motivated if the surrounding environment is conductive too their inherent tendency for psychological growth. But from the results it is questionable if the current environment in the institutions is conductive for the academics to achieve growth in research.

5.2.7 Conclusion:

This section of the discussions chapter has explored the various AD, EoCI and the CAE and how they are all inter-related to each other. It has also looked at the reasons for the AD and suggested ways to reduce it.

By looking at how AD and EoCI influence the RP of the academics, this discussion chapter answers research question 3: “How do the Elements of Cultural Identities and AD influence research productivity of the academics”. One of the original contributions made by this research is to shed light on the various AD at different levels of academia, and to look at the influence of EoCIs on the RP of the academics.

More than bringing answers, this section has raised even more questions for future researchers investigating how educational policies would be informed by empirical studies. Also what this discussion does not answer is how to improve the quality of the newly founded institutions. These are the institutions that are seen to be at the

receiving end due to the increase of institutions / seats, if they cannot recruit enough students and make money, how are they to pay their staff and in turn to improve their ranking, set up more facilities etc.? Further research should be conducted on this.

Mohamedbhai (2016) reports that eliminating corruption in HE is a mammoth task as it involves a range of stakeholders inside and outside the system. Though it might be challenging, AD and corruption in academia should stop as it would benefit all the stakeholders.

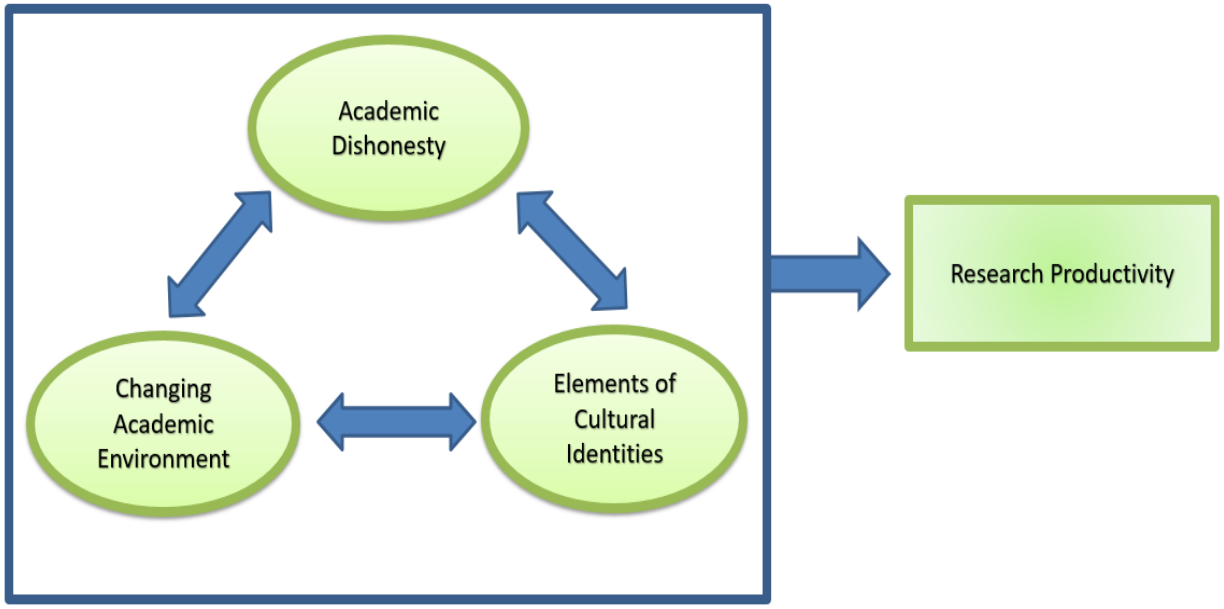
This chapter has discussed in detail the range of results from the questionnaire and interviews. The next chapter shows the various contributions this research has made to the literature and to conclude the thesis.

Chapter 6 Conclusion:

This chapter looks at the main contributions of this research to the literature on the motivation to conduct research and how to increase the research productivity of the academics in South India's HEIs. It looks at the novelty of this research. The chapter also revisits the research questions, aims and objectives of the research that were set out in chapter 1 and reviews if this research has achieved its goals. The various limitations of the study based on the methodology and results are discussed. The chapter concludes by exploring the possible future works in this field.

6.1 Contribution to the knowledge:

Fig.:41 Interaction between the factors and their influence on RP:



Source: Author

This research identifies the interconnections between the various factors (fig.41), and how these interconnections influence academics' RP. This is the first research to explore this and thus is a novel contribution to the literature. The other main contribution of this research is that it shows quantitatively and qualitatively the negative influence of AD and the CAE on academics' RP and the positive influence of EoCI on

their RP. The research shows that AD, EoCI and CAE not only influence RP independently, but due to the strong links between the factors, influence RP as a whole. The research also found that the interconnections between the factors cut across the staff, institutional and the governing bodies levels. The following section looks at few the interconnections and attempts to bring a rich story on how they influence the RP.

6.1.1: The combined influence of the factors on the academics' RP:

Exploring the contribution to literature further, though there are several interconnections between AD, EoCI and CAE, this section looks at a few of the important ones and how they influence RP.

From the data, it can be seen that one of the major changes (CAE) that has happened in academia recently is how the worth or efficiency of an academic is measured. Traditionally (EoCI) the expectation from an academic would be that they teach the subject in an interesting and understandable manner, and their efficiency would be measured based on their teaching prowess. Along with teaching, if they did conduct research, then they would be even more respected. But now, with the recent changes in the ranking system (NIRF, 2015), an academic's worth or efficiency is measured by how productive they are in research (RP). Based on the data, the researcher supposes that the academics currently are ill prepared for this change and in order to survive being an academic, and to quantify their RP, they involve in AD.

The increasing number of institutions (CAE) and the rapidly increasing number of seats available (CAE) in the last few years is one of the biggest changes in the HES in South India. The data suggests that this explosion of HEIs should have been better managed. The increase is due to the commercialisation of HE (CAE). Looking at it

from a cultural perspective (EoCI), the Supreme Court of India (Kapur and Mehta, 2004) comments that the purpose of the HEIs is them being institutions of public good, and a non-commercial entity. But in practice, with the HEIs becoming more of a money-making machine (CAE) clashes with the cultural values (EoCI). This CAE has also increased AD. For instance, how the institutions bribe the governing bodies and inspecting bodies in getting permission, affiliation, accreditation, recruiting ghost lecturers and to turn a blind eye to the lack of facilities etc. There is an unfavourable situation for the academics working in these sub-par institutions to conduct research and these academics would be more prone to AD for survival purposes, this in turn affects the quality of their RP.

Culturally (EoCI), HEIs have always been seen as a place that upheld moral standards and principles, but for such institutions to be involved in AD on such a scale (NewIndianXpress, 2018b, TheHindu, 2018, Tierney and Sabharwal, 2017, Mohamedbhai, 2016, Aaron, 2016, Tierney and Sabharwal, 2016, Mohamedbhai, 2015b, Anandakrishnan, 2013) shows how the institutions have taken a fall (CAE) from their moral high position. This clash between the EoCI and the changing academic environment (CAE) of AD has negatively influenced their moral standing.

The academics in one way or the other become a part of the institution's AD. This can be for instance accepting lower pay than the norms, accepting the presence of ghost students or ghost lecturers etc. during inspection etc. These have influenced how the academics perceive their profession of being an academic and thus again influencing their RP. The decline in the status (CAE) of being an academic, or of being a 'Guru' (EoCI) has also influenced their RP. This Is linked directly to the CAE and the EoCI. Culturally, a guru is considered an irreplaceable person of a community who imparts knowledge to his/her students. But with the recent changes in the academic environment (CAE), there is little job security and so the academics see themselves

as someone who is easily replaced. Along with this, when the institutions do not pay them properly (according to the norms), or pay them in arrears etc., it changes the perception academics have of the profession. Such poor conditions have even made the academics contemplate leaving the academic profession which has always been a highly respected one.

As an academic commented:

"…A lot of academics in the lower strata of institutions are losing their sense of being an academic and few of them have left academic profession and started food business, or milk vending etc. and usually they get paid more than being an academic."

Linking this comment with cultural perspective, this is a huge change, as most of the academics who choose to be an academic, have retired being an academic. Academia traditionally is viewed as more than just a profession, it has always been seen as a social responsibility and a service to the society. But the results suggest that the recent changes have pushed the academics to take up lower (culturally a milk vendor is lower in profession than a Guru) profession. This shows how much their sense of being an academic has altered.

When academics are contemplating on a career change, or of their poor pay or of the last months pay that is yet to be paid, it would be difficult for them to be research productive or to motivate them to be research productive.

Apart from this, the academics involving in AD is a self-inflicted fall from their traditionally held high moral standards (EoCI). This is a result of the CAE and the pressures it places on the academics. The research shows that 'Survival' and 'Lack of research skills' as two of the main reasons for the academics to be involved in AD, which in turn negatively influence their RP.

The pressure to publish is new for the academics and is a result of the CAE such as the NIRF ranking and the API scores (NIRF, 2015) which requires the academics to publish and to rigorously quantify their RP. Thus, there has been a huge increase in accountability in terms of research. There is also an increasing accountability for the academics in terms of the students' pass percentage, administrative duties and recruiting of students to the institutions. Traditionally, the academic profession has enjoyed a lot of autonomy, academic freedom and a considerable authority/respect within the community. These have always been few of the main draws or incentives of wanting to join an academic profession, but now with all these incentives being diluted the academics are losing their sense of being an academic. This further influences their capacity to be research productive.

6.1.2: Policy implications and the need for bespoke policies:

The importance of EoCIs in research also shows that the institutions, when forming their research policies, should not use / follow the Western theories blindly as it would result in missing out on the positive and significant effect of EoCIs. While policies are being formed, they should take into account the cultural differences between the countries where the theories were developed and where they are implemented or used.

The research shows the inverse relationship between EoCI and AD. So, in order to control / reduce AD, the research suggests that it is important to form bespoke policies based on cultural values. But whilst forming such policies, the interlink between EoCI and the CAE should be taken into consideration, for EoCI do not operate on their own due to the inter-connectedness of the factors (as seen in section 6.1.1.), if some strategy or a bespoke policy is to be developed to reduce the AD and to increase the

RP, then it is important that the complex relationship between the factors are taken into account.

This research has opened up a range of issues in the current academic scenario. There are already policies that exist at various levels (academic, institutional and governing body) to increase RP and to reduce AD, but they seem to be ineffective in either increasing the quality of research published or to reduce the AD that was commented to be the norm. So, the effectiveness of these policies should be assessed, and changes made. The research suggests that bespoke policies should be formed based on EoCI and the results from the research.

The researcher supposes that such a bespoke policy should advocate training the academics rather than putting in more checks and regulations. The easiest and the most effective way to reduce AD would be to equip the academics with research skills. The policies should make provisions for the academics to learn research methods, statistics, programming skills etc. which from the interview were commented to be deficient.

Rather than having more punishment techniques such as demotion of those involved in AD, arrest, extra policing and additional monitoring bodies to reduce AD, etc. which would require more resources and time, giving the academics the ability and opportunity to conduct research would motivate them to conduct research honestly. This would ensure that they are more confident in conducting research and would not/less engage in AD. Also, that after their PhD, they will be more honest in their research practices. This might influence the students they supervise and thus progressively reduce AD. This will also ensure the distance between the moral and social norms in conducting research will reduce.

On top of equipping the academics with proper research skills, cultural elements can be advocated by the policies so that the academics can sustain their honesty. More

research is required to identify further the links between the various factors and their influence on RP. A separate research on the characteristics of a bespoke policy based on cultural values should be conducted. Also, the effectiveness of the policy in reducing AD should be tested. This research along with answering the set research questions, have opened up further questions that needs exploring.

6.1.4 Other contribution to knowledge:

By understanding the importance of the EoCI in reducing AD and in increasing the academics' RP, this research supports the arguments of Kao and Sek-Hong (1997) who comment on building motivational practices based on their traditional values. This research has made the first attempt in exploring the formulation of motivational practices to increase the RP of the academics taking into account the indigenous factors suited to the Indian environment. This research building on Kao and Sek-Hong (1997) arguments, recommends formulation of bespoke indigenous research policies to increase RP.

This is the first empirical work to quantitatively and qualitatively explore the effects of the rapidly evolving academic environment, especially the negative impacts of the unplanned increase in the number of institutions and seats available in engineering. The research also looks at how it has impacted on the survival of the institutions and how the institutions have responded to these changes. The research suggests that the new institutions could settle down as a teaching institution and gradually build up their research facilities and resources and not to force their staff to publish papers without proper training and the necessary facilities available – solely to increase their NIRF ranking

The research offers suggestions on the changes that could be made at individual/ academic level and at the institutional level to reduce AD and to increase the quality

of research. It offers a framework which might help the institutions to improve their RP and better allocate resources.

The lessons from this research can be applied to institutions specialising in disciplines other than engineering and also to institutions in other part of the country, but it should be investigated with a new local data. The results of this research can be used as a basis for further investigations and for the institutions to form their research policies and to help their academics to conduct and produce high quality publications.

6.2 Novelty of this research:

Exploring the literature, it is seen that this is the first research to look at the influence of various factors on the RP of the academics in a rapidly evolving academic environment such as in Coimbatore and thus is novel and contributes to the literature. This research has not only measured the influence of various factors but also qualitatively explored how and why these factors influence the RP of the academics. The other important contributions of this research can be listed as following:

1. This is the first empirical research looking at the influence of AD on the RP of the academics.

2. This is one of the first studies to empirically explore the various AD and corruption at different levels of academia and the first in South India.

3. This is the first study to look at AD from the perspective of the ‘research consultants’ or ‘agencies’ in South India.

4. This is the first study in South India to employ mixed methods approach and to employ a theory building approach.

5. It is the first study to quantitatively measure and to explore how EoCIs influence the RP of the South Indian academics and their motivation to conduct research.

6. This is the first study to look at the interaction between EoCIs and AD and to explore how this interaction influences the RP of the academics.

In addition, this study goes beyond just looking at the influence of the individual factors on the RP of the academics, but how interconnected the changing academic environment, AD at various levels and EoCI are with how and why research is conducted and on the RP itself.

There have been newspaper articles and non-empirical studies that have looked at the influence of AD in academia as can be seen in NewIndianXpress (2018b), TheHindu (2018), Panchu (2017), Aaron (2016), Mohamedbhai (2016), Mohamedbhai (2015a) and Anandakrishnan (2013). Recently, there have been two empirical studies by Tierney and Sabharwal (2017) and Tierney and Sabharwal (2016) conducted in North India looking at the various forms of AD in academia, but no empirical study has previously been conducted in South India in this area and this is the first study to do so.

The empirical studies by Tierney and Sabharwal (2017) and Tierney and Sabharwal (2016) only explore the different forms of AD in academia, and do not look at the influence of AD on the RP of the academics. This research goes beyond just identifying the forms of AD, and measures quantitatively the negative influence of AD on the RP of the academics and their institutions.

From the interviews a list of AD at different levels within the HES were identified. The institutions and the governing bodies while making their research or Human Resource

(HR) policies can make use of the points discussed here on AD to reduce it in research and at the institutional level.

Also, no study has previously looked at AD from the perspective of the so called “Research consultancies” (agencies) and how they influence the RP of the academics. One paper that the researcher suspects might have been reporting on the agencies in India is by Sivasubramaniam et al. (2016), but the authors do not state the country where their research was carried out, so this work is one of the first studies carried out by interviewing the agencies.

This research also discusses the reasons why academics approach the agencies and how these agencies fake data collection to produce “research”. It discusses on how they help the academics to finish their PhD or to publish their papers. By collecting empirical data from the agencies in South India, this research has again contributed to understanding and literature and has opened an avenue that needs to be explored in order to reduce AD in the institutions.

This research goes beyond simply measuring and exploring the influence of individual factors on the RP of the academics. The research suggests how factors such as AD, EoCIs, the rapidly evolving academic environment, the response of the institutions to these changes etc. are all interconnected and influence both the RP of the academics and each other. This is a novel contribution to the literature.

6.3 Meeting the research questions, aim and objectives of the research:

6.3.1 Meeting the aim of the research:

The aim of this research is “To identify and critically evaluate the various factors impacting the academics’ motivation to increase their research productivity in a rapidly evolving, Coimbatore’s academic environment.” This research has successfully achieved this aim by identifying and evaluating the various factors such as personal, professional, organisational, changing academic environment, AD, EoCIs etc. and how they impact the motivation of the academics to increase their research productivity of the academics. It has not only measured the impact, but also has opened up new research areas relating to the RP of the academics. This research has identified a range of hindrances to producing high quantity and high-quality research.

6.3.2 Meeting the objectives of the research:

In terms of the objectives, the first objective “undertake a literature review and Identify the various factors that influence the motivation to publish and the research productivity of academics” was achieved by conducting a thorough review of the literature on the RP of the academics and building a comprehensive knowledge on the factors influencing them.

The second objective “to evaluate the main factors identified and to produce a conceptual framework that may be used to assess the research productivity and motivation in South Indian academics” was achieved by critically assessing the literature on academic research motivation and to see if there are any models that are applicable for the Indian scenario. The research also conducted a scientometric review of the various papers in India, thus localising the research on academic motivation to

conduct research. The literature was used to review and identify the various important concerns in the HE system and their impact on the RP.

The third objective “apply the framework in Coimbatore’s engineering institutions and test its effectiveness and to identify factors that are unique to the rapidly changing South Indian academic environment” was achieved by collecting quantitative and qualitative data and analysing them to measure and understand how the various factors influence the RP of the academics and how they are inter-related.

The fourth objective “Refine the assessment tool and to produce a framework that can be applied in the South Indian academic system” was met by the various frameworks that have been produced from the quantitative / qualitative results. Also, it was met by the various suggestions given to reduce AD and increase the RP.

6.3.3 Meeting the research questions:

In terms of the research questions, the first research question “what are the dominant motivational factors affecting the motivation and the research productivity of Coimbatore’s engineering academics?” was answered by the quantitative results from the questionnaire. Six factors were identified: personal, professional, organisational, AD, EoCIs and the changing academic environment. Along with simply identifying them, the impact of the factors on both the ORP and the EoRP were measured. The influences of demographics were also measured.

The second research question “to what extent do the demographic differences influence research productivity?” was answered by measuring the impact of the various demographic factors on the ORP and the EoRP of the academics. Qualitative data is also used to understand how and why the demographic factors influence the RP of the academics.

The third research question “How does the EoCIs and AD influence the research productivity of the academics?” was extensively explored using both quantitative and qualitative data, in which not only the impact of the EoCIs and the AD were measured but also the reasons for the AD, EoCIs and the interaction between AD and EoCIs were explored. This has revealed a plethora of variables that cause and influence the RP at various levels of academia.

The fourth research question “What type of a framework should be developed for the HEIs to encourage the academics’ productivity?” was answered by a combination of the first three research questions and the frameworks developed for ORP and the EoRP. This can be used for forming policies. Fig. 41a, b, c and d form the pictorial representations of the frameworks based on the regression models.

Fig. 41.a: Pictorial representation of the framework to increase ORP:

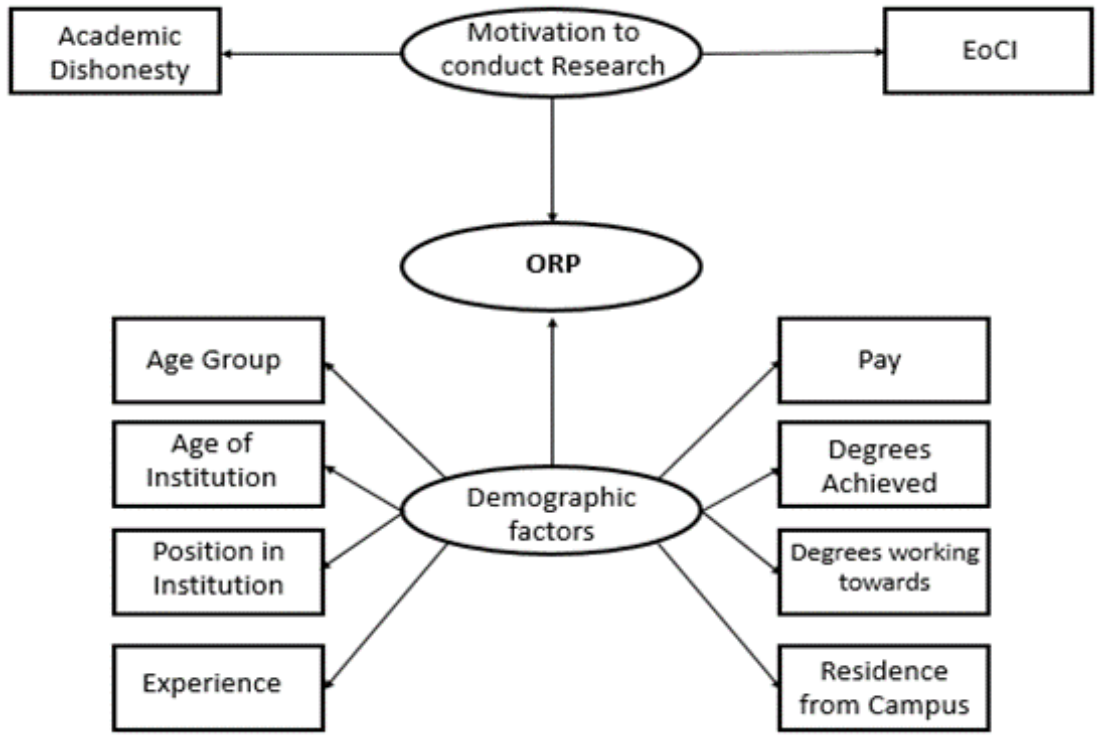


Fig. 41.b: Pictorial representation of the framework to increase OSS:

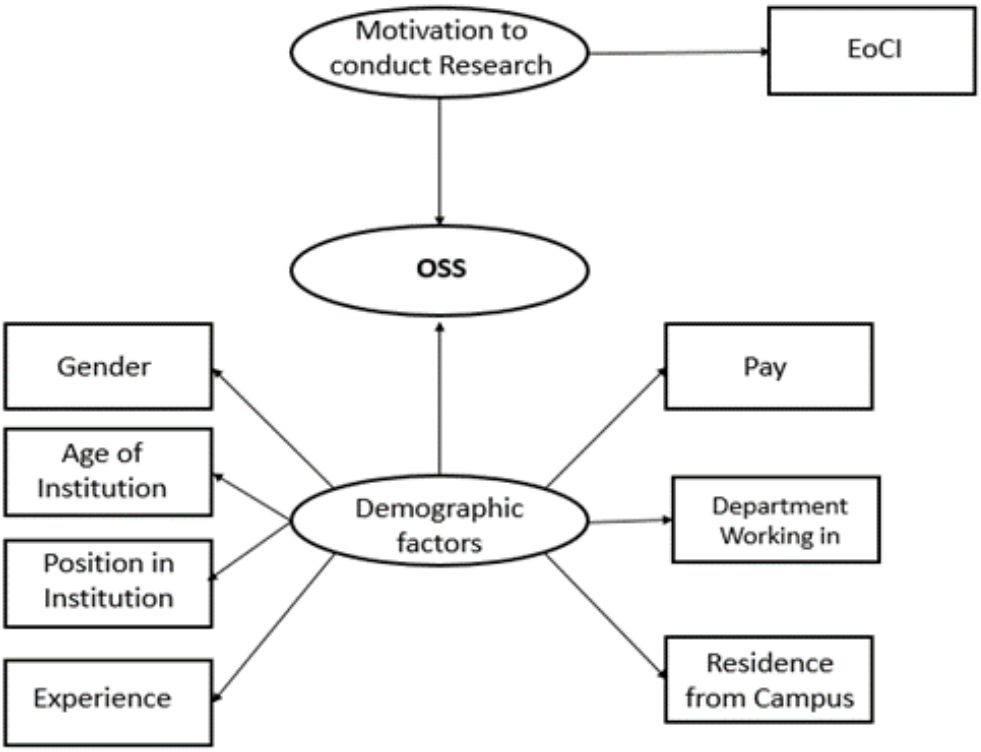


Fig. 41.c: Pictorial representation of the framework to increase OCS:

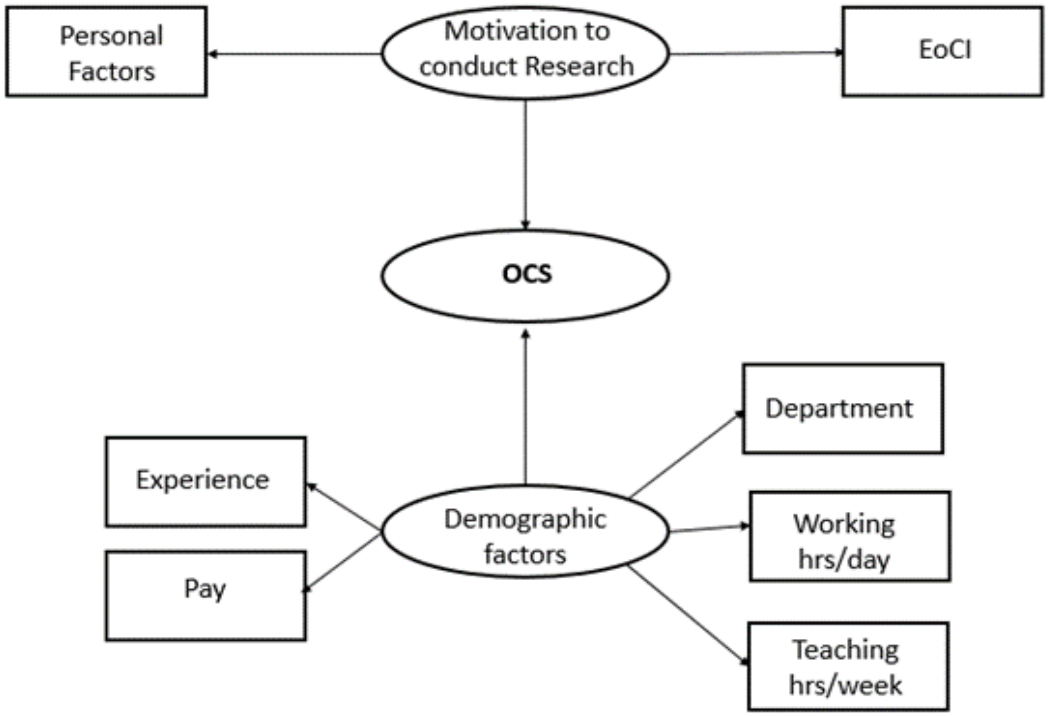
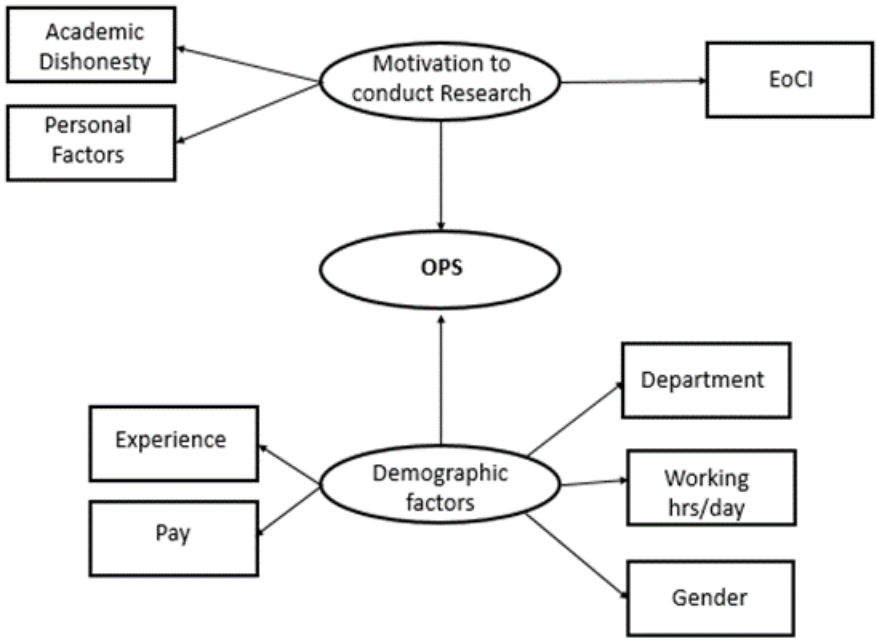


Fig. 41.d: Pictorial representation of the framework to increase OPS:



6.4 Limitations of the study and future work:

This section provides a realistic and self-critical description of the limitations of the current research, the reasons for them and discusses how any future research can build on this. With any research, there are limitations and it is important that the researcher acknowledges them clearly and how future research could be based on them (Brutus et al., 2013, Ioannidis, 2007, Price and Murnan, 2004).

This research was conducted in Coimbatore's engineering institutions, which might reflect the situation in South India, but generalising it to the whole country or to Asia should be done carefully, as the socio-economic and cultural environments are different. Conducting a nationwide study would have been too big and difficult for this PhD, so Coimbatore was chosen as a case study. A nationwide or a South-East Asia wide study could be conducted in the future that could compare the different geographic regions and the RP of the academics in them.

The ability of this research to statistically make inferences from the sample of engineering academics towards the RP of academics in disciplines such as

humanities, science, medicine etc. might potentially be limited and must be done with caution. It should be noted that for disciplines such as management and humanities there is no need for a lot of scientific equipment and tools or infrastructure that engineering research demands, so the results might be different in terms of the need for resources.

This research could have included different disciplines, but to do so would have been a massive task and it would reduce its focus, which has been avoided as it focuses only on engineering institutions. Future researches can look at comparing the different disciplines and the applicability of the results from this research to those disciplines. One commonality between the academics in all the different disciplines would be that they would have largely come through the same educational system and will operate in a similar cultural environment to that of the engineering academics.

A future study that collects data from the governing bodies can be conducted and their perception on RP, AD etc. can be compared with that of the institutions' and the academics' This would give a wider perspective of the concerns in the HE system and ways to overcome them.

The research has considered only those institutions started after 1990 which is, after when India adopted market liberalisation and globalisation. Future research could collect data and compare all the Indian institutions.

In the interviews, only two respondents were from the educational consultancies, the others could not take part in the interviews due to time constraints. The limited access to the agencies might potentially limit the ability to make broader generalisations on how they impact on the RP and the quality of the research published by the academics. Future research could focus on the scale of these agencies and how they impact the

RP of the academics and the quality of their research, and how useful the results they produce are.

This research has considered EoCI, AD, personal factors as a combination of factors influencing the RP of the academics and has not looked at each of them independently. This could potentially open avenues for future research.

This research did not look at the quality of the research measured through the citation index and the impact factor of the journals. More comprehensive research could potentially be conducted considering both the quality and/or the quantity of the RP of the academics.

Future researchers could also look at developing interventions to increase the quantity and the quality of the research by the academics, implement them in institutions to test their effectiveness in increasing the RP of their academics.

A longitudinal study could be conducted to assess how the RP of the academics change over time. A longitudinal study would also provide data over several years of a changing academic environment and its' impact on RP.

Overall, this section has looked at the various limitations of this research, the reasons for them and the future research that could be built upon this work.

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Appendix 1: Introspection and suggestions from the researcher:

Appendix 1 is divided into two sections; the first section looks at the researcher's introspection of the research on the RP of the academics and the second section looks at few of the suggestions from the researcher to reduce AD.

Section 1: Introspection

Introduction:

In this section, I reflect on the various events and thoughts I have had over the years and relate it to the research in terms of the RP of the academics. More than a reflective piece of work, this section is in the region between reflection and introspection. This goes beyond just linking personal thoughts with Research Productivity (RP), but not a complete introspection as it's epistemology is requires a completely different thought process and on that I have not had training in. I will use a first-person voice as these are my own thoughts linked with the research.

Reflective thinking:

Reflective practice is the ability to think back and reflect on how certain phenomenon or events are linked with one's actions thus trying to develop insights on the relation between the phenomenon and the reflective practitioner, thus resulting in continuous learning (Schon, 1984, Bolton, 2010). The advantages of reflecting on a research process include creating a deeper understanding of why the processes are the way they are. Being able to relate the concept under study with the personal thoughts of the researcher, it provides a critical review of both the study and the thoughts of the researcher and building theories from observations of practical everyday situations. Overall, it helps the researcher in deepening their understanding of the research and the phenomenon they are investigating (Knott and Scragg, 2016, Ruch, 2002, Clift et al., 1990). They also state the importance of a reflective practise in a professional environment. For my Post Graduate Certificate in Education (PGCE) I had to write several reflective essays which actually helped me to relate the theories of teaching and learning with everyday practice and how to change the practices to create a better learning environment.

I start this section by acknowledging that a qualitative method as this might not be something an Engineering School (To which I belong) would approve of as being a valid approach. I understand that as engineers (If I can call myself one as well) are used to hard facts, numbers, objective observations and values resulting from the observations. To be able to make a complete shift of methodological paradigm and to trust data from a subjective stream would be difficult - as it was for me initially. But reflective practice is heavily used in social sciences and especially in educational studies and research (Ruch, 2002, Clift et al., 1990).

This section will discuss the introspection (Let us call it so for simplicity's sake) in terms of the following themes that have emerged based on the quantitative and qualitative data, analysis.

Themes of Introspection:

1. The Conception Academic Dishonesty (AD)
2. Reasons for AD
3. The cultural system and its influence on AD, RP
4. Money oriented environment and its influence on AD, RP and
5. The overall educational system.

I have not reflected on the themes individually but have discussed the inter-relationships between them.

AD and asking for professional help:

I can relate the situation in which academics go to the agencies for help in writing papers or for the research itself to that of how I approached the visa application and its associated paper work for travel to Portugal in 2017 to start a research internship at The Center for Research in Higher Education Policies (CIPES).

Even though I understood the procedure for visa application and had the list of documents required and could have done it on my own, I went to an agency which helps people to get visas for a small commission. Both my friends and family strongly advised me to seek the assistance of a professional agency stating that the agencies have experience in such matters and that it is important I consult them and go through them. This did put a considerable amount of doubt in me that I might falter if I were to do it on my own and that placing trust in an expert is better than doing it myself even though I knew what I had to do. Eventually, I did consult an agent for at least a part of the visa application.

Relating this to the academics conducting research in India, the data indicates that they are not confident in their own writing and analysis skills. In such a scenario, it is understandable and normal that they seek the help of an agency to do it for them just as the trust my own environment had in the use of an agent/expert influenced my own decision to use one it would be hard to imagine academics not being influenced by those around them to seek support. In their own words:

"Since I am not sure/confused/ don't know how to analyse the data, I have asked my partner/friend/a statistician/agent to do it for me. He is just analysing it; the research is still mine".

AD and the influence of the environment:

The questions that fills me with empathy for the academics in India is 'How different would have I been if I were in their situation as discussed in the previous section? Would I still have the (presumed) moral high ground or would I be one with the crowd? Similarly, how different they would have been if they had the opportunities I had and still have?'

I have been proud of what I have done so far, in terms of doing all my research by myself, struggling with statistics, travelling to collect data and for the tears I have shed etc. But knowing that I might have done the same as them in the given situation or surroundings or that they might have done the same as me or even better in my environment, so what am I to be proud about? My work or the environment that I was fortunate to be a part of? I cannot be proud of 'being fortunate' but only my work and this introspection has cast a shadow of a doubt over my work.

Overall, the concept of environment and growth relates to the Job Enrichment movement (Herzberg, 1959) in which a person would develop when a favourable environment and opportunities are provided. Also it relates to socio-constructionism (Vygotsky, 1997) in which behaviours are seen as interactions between the individual and the environment. When the environment is conductive to proper research practices, so will the participants of that environment

Influence of EoCIs on teaching and research:

Another aspect that I found from interacting with academics was that they consider 'Teaching' as their moral duty whereas 'Research' is just a "necessary evil" that they have to do for promotion, better pay, or to keep up their position.

I can understand academics considering 'Teaching' as a moral duty – especially when they are not motivated towards research, so they presume their contribution to the students will be through teaching. I can also see that they are more confident with their teaching skills (something they are used to) rather than conducting research, making them to lean more towards teaching.

But, teaching just the subjects, just the facts? Is that only what they consider as their moral duty? I believe that it should be encouraging critical thinking in the students, it should be about creating students who are aware of the issues of environment, about ethics etc. Well, perhaps my conception of 'Moral duty in teaching' is different and it is mine that should change.

Ignorance on paid journals:

A few years ago, I remember receiving mails on a regular basis from journals that requested an 'Article Processing Charge' (APC) when submitting papers. At that time, I had no clue about APC and I thought that it was a common thing, so I was a bit tempted. I discussed with my supervisor about it, who strongly dissuaded me from publishing in any journals charging APC saying that it is a glorified name for a paid journal and he explained to me how they work and their low quality, which was an eye opener.

So, it is also possible that some of the academics who publish in paid journals are not aware of the whole picture and when they see that their colleagues are doing so and publish what perhaps is good research in such journals. However (Gopalakrishnan et al., 2016) state that most of the authors make an informed choice to publish in them.

Reflections on a money-oriented environment:

I was invited to give a guest lecture at a local engineering college in Coimbatore and the local lecturer asked me if I was expecting them to pay me. I have always abhorred the concept of getting money for guest lectures and have firmly believed that education must be free at least from me. But when this person asked me – I paused for a moment and thought to myself it would be good to have some money from them.

I felt bad for the occurrence of this thought and at that moment, I was ready to compromise one of the principles that I held for a long time. I reflected on why such a thought which is contradictory to my principle, occurred. I realise that right from the beginning, I have had a proper job either full or part time and that previously I visited India only for one-month period, whereas now I was staying in India for more than 5 months with no income (As I quit my lecturer job in the UK) and so wanting to earn had become a priority. Or even perhaps that I lacked the reward for my efforts, or just that what motivated me had changed as I fell down Maslow's pyramid (Maslow, 1954) from a level of wanting to be of use and service to that of financial need.

I can relate this with the Indian academics when 34% of them earn less than Rs. 25k/month (From the data) and are looking for a better pay and position. It may not be surprising that many of them might be prepared to pay an agency and relax their ethics to satisfy their need to earn higher pay. Especially in the current commercialised situation in India where people commonly express and believe things like: *"A person is nothing without money", "You will be respected only if you have money"* etc., holding onto principles might be very difficult for academics or anyone else in that situation.

Linking AD with money orientation and social pressure:

One of my friends is currently doing her PhD. Even though she is teaching management, she admitted to not knowing even the basics of statistics. So, I volunteered to teach her if she wanted. But she wanted me to do the complete analysis for her and even offered me a good sum of money for it, which I declined. I had to say that my research is about decreasing AD and I do not want to be a part of it. I still remember her saying "Come on, break your ethics just for a day". These are the teachers who ask the students not to cheat in the exam, not to copy from each other and not to plagiarise etc. Do these rules not apply to them?

I felt sorry for her that I had to decline the offer again, especially in India, where saving the face of the other person is pretty important.

When I was discussing this event with two of my relatives, they were surprised that I declined 'Making money' with my knowledge, and they questioned what the use of my knowledge is if it is not used for earning. When I stated that it is not ethical for me to do her research for her, the reply was *"You are not doing it for free*". I was very surprised that they saw ethics and money as inter-changeable. Has the concept of 'Money making' gone so far in the minds of people?

One of the explanations for the people becoming money oriented is that in India with the growing population – predicted to be the most populous nation by 2030 (PRB-Report, 2011), there is a huge competition to be better than others in the community, to differentiate themselves from others and the easiest way to do it is based on the amount of the money one has. Perhaps this is what drives people to be unethical. To get things done quickly, to do it easily they take the short cut and pay their way through. I was also told off for not 'Helping' a friend! Perhaps it is difficult to be idealistic in long term. Even a person of high moral would be worn down and maybe that is what is happening here currently. I can relate this to an academic starting his profession with high morals principles and then eroding away due to the social pressures and the prevailing culture of money making.

Reflections on AD and the inequity I felt:

After I declined to do the analysis for her, she called me a couple of weeks later and asked me a question on Factor Analysis (FA). I was very surprised how it was possible for her to have progressed so quickly, from not knowing how to enter the data into SPSS to almost completing her FA.

Whilst enquiring about it and how she managed to finish all the previous steps before FA, she said that one of her colleagues is doing all the analysis for her! And that the colleague has a question on FA, for which she needed help. I had a lot of emotions when I heard that she used a shortcut (an extreme shortcut) to reach to this stage, which took me months of toil, reading books, asking help from statisticians, lecturers, doing it on my own, and she just did it all in a couple of weeks!

I recognised that there was a huge inequity in the efforts that we had both put in to reach that stage in analysis. Even though the paths we chose in terms of 'how' and 'who' did the analysis were different; but in the end, both of us would get our PhDs and be titled as Dr. I felt very sad, angry and disappointed – initially for her, but then for myself. I questioned if I had chosen the wrong path, the difficult path and if she were clever and that I was not. As an old Tamil proverb goes "In a town full of naked people, a person wearing cloths would be laughed upon as a fool".

The above reflection marries with what the interviewees said about how they felt when they wanted to do their research properly but then their colleague does it with an agency, get a promotion and a higher salary compared to them. This prompts them towards AD too.

Liking AD with the collegial environment:

That is when it occurred to me that I am an outsider to this system (even though I am a local by birth). If this situation of inequity between my friend and I had caused distress, then how much would such inequity affect the academics who are working in India? When they see their colleague is involved in AD and reaping the benefits of having a doctorate whilst they are still toiling. It will create stronger feelings of inequity in them. Similar to the thought that occurred to me – they would have been easily persuaded to take a short cut as well.

AD and the spiritual consequences:

The research is conducted in India and so a spiritual dimension should also be considered. Similar to the philosophies of Hinduism, which is being followed by almost 80% of the population (ORGI, 2011), (Lama, 2001) states that in Buddhism all things are inter-related and do not exist on their own and that every action has consequences, either positive or negative. In Indian culture any misdemeanour a person commits has its consequences that the person becomes responsible for, unlike in Western religion where the sins are taken away by God, in Eastern beliefs the person carries the consequences of his actions (Karma). If so, then even 'AD' will have its negative consequences.

Even though spirituality, EoCIs, etc. look to be very personal and individual factors, it appears that the environment easily changes the perceptions of individuals. Looking at the scale of the AD, I am not sure if the academics who involve in AD really consider EoCIs, and spirituality as an influencing factor in them conducting research.

On the fluidity of ethics based on the surroundings:

Being ethical, or ethical acts are very fluid concepts that vary over time and between cultures, countries etc., The way one looks at ethics is based on what goes on in the surroundings, how other people behave, the rules of the Government, the social code, the needs of the people, on what the society emphasises etc. Perhaps it is not a good idea to use the same measuring stick between different cultures and countries especially for social phenomenon.

Until now, this chapter on introspection has looked at AD from my perspective as an outsider, perhaps if an Indian academic explores the same concept, it might very well be different as their view of what constitutes ethical principles might be different. Someone who knows nothing about Indian culture might also have very different views. This brings in the concept of indigenising the practices and theories according to the environment in which they are applied.

I have to confess, that once when I started to analyse the data and was struggling with SPSS, I did think of asking a management student to do it for me, but I wanted to give it a go and used a few books and contacted Alexandra (A lecturer who has done a similar research on the RP of Romanian academics) who advised me online on my questions. It was difficult to attend lectures on stats. at the University or to meet the statistics lecturers as I was working full-time. When I finished work at 5pm, so did the lecturers. Only during the half term holidays and if the lecturers were free I met them, even then I struggled to even know what questions I should ask. After I started to understand statistics, the different tests used and how to use SPSS – I was drawn into it and felt an enthusiasm for statistical analysis.

Again, the concept of ethics at that time when I thought of asking a management student to do it for me, was fluid. Future researches could take this into consideration.

Introspecting on the set of factors that made me to conduct all the analysis on my own were:

1. The academic system at the Plymouth University where self-motivated research is valued more than just the results (At least I think so). Where the academic system (Perhaps) rejects AD when compared with the educational system in India. For I cannot imagine my supervisors asking me to pay them, or them agreeing with me to change the data to fit with the anticipated results.
2. The support from my supervisors even before I started the PhD has been tremendous. Perhaps wanting to be like them (Again such a thought might be reminiscent of my Indian thought process of holding teachers in high esteem, considering them to be a role model) might be another reason.
3. The freedom and understanding I have had from my supervisors, not tying me with strict deadlines (thinking of it now, it might have been a bit useful!) and knowing my situations were helpful.
4. Perhaps being single also helped, because I did not have to bother too much about wanting to earn more money to support the family.
5. Alexandra, even though we have never met each other face to face, has responded to my questions and doubts very quickly in email or through social media. I would have struggled without her help and might have even been tempted to ask someone else to analyse it for me. Knowing that I can get her help is another reason for me to want to do it all on my own.
6. More than anything, it is a dream for me to finish a PhD and to be a researcher. I want it to be my own real effort that made it come true.

I think that it is the combination of all the above factors (that I can think of) that made me not to resort to AD (As far as I am aware). It is questionable how many of the academics in the target population have had such a combination.

I was caught between two things, a sense of patriotism which tried preventing me from exposing: the AD, the low quality of research of my own country to an international audience and reporting the results based on empirical data. The dilemma was also because of the difference between what I thought research in India would be to how it really is. It was difficult initially, but I drew inspiration from Charles Darwin who chose to report scientific facts contradictory to the popular religious believes. Also, by reporting AD as it is, I believe that this research would start a debate on the existence of AD and the ways to reduce it, thus enhancing the quality of the RP. If I had not reported AD as it is, that is when I would have done a disservice to the academic community, the country and to my own conscience. All these reflections might sound philosophical and far from the data, well the ‘Ph.’ in the PhD does stand for philosophy.

Conclusion:

Overall, this chapter has served as a space for me to reflect on the research, how it has influenced me and vice versa based on the themes that came out of the quantitative and qualitative data.

A concluding remark would be that AD should not be viewed as a phenomenon on its own, rather as a consequence of a myriad of causes: The educational system with its emphasis on marks rather than understanding, the corrupt environment at different levels of social and administrative structures, dishonest academics not being found out, academics not being paid properly, pressures to recruit students, job insecurity, institutions not focussed on research, the academics not being very confident in their research skills etc. Along with these, there is an added pressure to publish. I suppose I could add many other factors that might have an influence on the 'AD' of the academics like the reward mechanisms, high expectations from their parents etc. I think that a mixture of all these result in AD. Being aware of a spectrum of AD has cast a shadow on the quality of the degrees, especially the PhDs that are granted in South India.

Second section: Suggestions from the author

This section of appendix looks at few of the suggestions from the author to reduce AD. Since they are personal suggestions from the researcher, they are given in the introspection chapter.

A few suggestions from the author to reduce AD:

This research, might look as if it advocates a softer approach by just looking at the training needs and equipping the researchers and PhD students and not advocating punishment techniques such as extra policing, demotion of those involved in AD, arresting etc., but putting in more policing and monitoring bodies – would mean that a lot more time and resources would be wasted in the policing with the skill set of the academics still remaining the same.

This research suggests that even during their MPhil, the staff could conduct a pilot research which they can use it for learning different techniques, software and the tools for conducting research. This would increase their confidence in using the tools for conducting PhD.

This research also suggests Institution should allocate set timing for the researchers to conduct their PhD or research work. This will ensure that the academics have both the ability and the opportunity to conduct research. This will also mean that they will not/less engage in AD and that after their PhD, they will be more honest in their research practices. This might progressively reduce AD.

If there are any training practices and courses that are already available for the staff, the effectiveness of these should be quantitatively and qualitatively tested to identify any flaws so that they can be altered.

5.2.1.8.3 A possible Utopia:

Working for these agencies is not the first choice of the staff who work there until and unless they. Unemployment of high calibre graduates is a major reason for them joining these agencies (Sivasubramaniam et al., 2016).This is also reflected in the interviews.

One strategy that the institutions might adopt is to hire the research agency staff as consultants or as research assistants to work at the HEIs and thus reducing AD, them being able to access the resources of the institutions and the institution utilising the talents of those agency staff members which would also provide them with a proper work. It is not new to employ hackers to safeguard Government online systems, so might be possible to do this. This sounds utopic, but it remains a necessary Utopia, from which all the stakeholders are benefited.

Appendix 2: Interviews with the academics and managers:

This appendix gives the results based on the qualitative interviews with the academics. This is a part of chapter 4, results.

The following section is a summary of the interview responses from the nine academics and the five managers.

Question 1: why do you think that factors (i.e. EoCI) like 'Being of service', 'Moral duty', 'God given duty', 'Role model' and 'Devine merit (Punniyam)' important for ORP?

The respondents gave a mixed answer to this question, with ten of them eight of them agreeing the importance of EoCI in increasing the ORP of the academics, whereas the rest of them disagreeing to it.

"An individual's mindset is for sure influenced by the EoCIs. If the mindset is ethical and they want to do research for the right reasons, then you can see that they give importance to things like 'Moral duty', being a role model, etc." At least they will be sacred doing this as it is a duty towards God. But if the individual mindset is not good, then it would be difficult".

"The cultural factors you have asked are very important, this is where we come from, this is our background – so I am sure it will have an impact on how people see and do their research".

"You could see these things (EoCI) only in India, may be in Sri Lanka or Nepal. But not in Western countries".

*"Having a role model and wanting to be one is very important. I did my PG at *** institution and I have taken my professors Dr.**** and Dr.**** as my inspiration and want to emulate them in my academic life, but if you have unethical staff members as staff, then it would influence a person's research life when they come to it".*

"You get influenced by those who you see around you. especially in India, where people take their seniors/ elders as role model by default (Which is one of the elements of the culture of the nation), then it is easy to become like them – ethical or unethical in research".

"It was a divine merit that I was able get into such a good institution for the P.G.".

Few of the academics disagreed with the importance of EoCIs influencing RP of the academics.

"I differ in my opinion, research is something that has started to become important only recently in the last decade or so before that, Indian academia has been concerned only with teaching. So, the moral duty, God given duty etc. applies to teaching not to research – at least to me".

"It is just for survival that people do research, only 1 out of 100 do research out of passion, the others for mere survival. Passion is something personal for each of them".

"Only in the last 5 years, there is a lot of pressure to conduct research and it is a current trend. It is just seen as an additional agenda along with teaching. Even for that the institutions are just asking to publish a paper, they are not concerned about the quality of the paper, just to show the accrediting bodies, they are asked to do research".

"In simple terms, EoCI influences the attitude of the academics wanting to do proper research not the RP itself, which is a by-product of that attitude, whereas AD will also increase the RP, but not the quality". "It is a very personal thing. When people think what you say (EoCI) are important, then they are ethical, and when they do not consider them (EoCI) to be important, then they are not ethical".

Overall, it was seen that AD and EoCI are a personal thing that influences the academics' attitude of conducting research.

Question 2: How important are the EoCI and how do you think they influence the ORP of academics?

Overall the respondents agreed about the importance of the EoCIs in RP in an ideal situation. However, they said that practically, at least in the current situation, EoCIs are not seen as a major influencer. Four of the respondents stated making money as the primary driver for RP compared to EoCIs which are only secondary.

Respondent 4 stated the importance of EoCI for ORP as:

"Mostly 'Being a role model' is the most important factor, when the academics think that my research will be used in the future, they should cite my work, that I will be a role model to others, then they will conduct good research".

A common theme that emerged and that was repeated by seven different respondents was that EoCIs served as an inspiration for people to do research without any dishonesty, whereas people who do not consider EoCI to be important are more prone to AD.

"EoCI does not affect RP directly, but it affects how the academics do research. I would not say that people who have high score for EoCI have more or less publications or something… but those who think that it (EoCI) *is important, will do proper research".*

But there were responses which connected the EoCIs indirectly with RP of the academics. The connections were both positive and negatively associated. It also showed how academics who are influenced by EoCIs feel a lot of pressure to quickly publish to keep themselves

competitive with those who are dishonest in their research. The pressure to earn money is another reason for the academics to quickly publish and not consider EoCIs to be important.

"People who are more honest, who want to do the research on their own, collect and analyse data properly etc. for them the cultural factors that you speak of are very important for their research. Yes"

"99.9% of the people doing research do not do it because they want to be of service, or to find something new, or find new methodology but just for their own personal growth".

"What you say (EoCI) are highly important for the quality of the research. It takes a long time for people with EoCI and honesty to publish, making their RP to be lower. Whereas someone who is dishonest, finds it easy to have more publications".

"They just change the numbers, make minor alterations and publish it again. Moral duty is something that I think no one thinks of these days in research".

"It is just a lie that EoCI influence the ORP of academics, most of them are only concerned with promotion and increment. If you tell them that there is no need to conduct research for getting promoted or for pay rise, very few will do research".

"Due to pressure, only fake results come out, he (Academics in general) is doing research just for the sake of numbers, for finishing his PhD, for promotion etc., that too he is publishing in unethical, paid and all sort of negative journals".

"In terms of Indian culture, family comes first before profession, especially after they get married and after having children. For example, if a lecturer has a loan or a family commitment that he cannot forego - then he will be forced to take a decision to stay here (In that particular institution) and in order to stay he has to publish, but he is unable to so he gives in to academic dishonesty."

The need for money, having a quick promotion and getting an increment etc. were seen to be influencing the quantity of research more than the EoCIs, which were clearly having more impact on quality of the research.

"Everyone needs money, that is the ultimate requirement. What can you do without money? Research and all those things are for making money, service and all things are there, but there is a need for money, the service and role model factors are usually ignored."

"There was an article in the TV on the declining status of PhD the other day, in which they show that academics are just looking for better pay, promotion etc. so they just copy, paste some work (plagiarise), edit the words or just modify some criteria and publish in some paid journal. This will give them an incentive or a pay rise, that is how they think."

"Most of the people do research not because they really want to do it or out of their own interest, but it has become mandatory for them to do it to stay in teaching. Survival is one of the main factors for them to do research."

"Research has become money oriented now, for both the management and the academics. If I register for a PhD, I want to finish it soon so that I get an increment of Rs. 10,000 to 20,000. To finish soon, I think what to do to finish soon, that is when I will go for shortcuts."

It was also seen that the academics were not sure about how EoCI and RP are related and that EoCI are inherent in the mind-set of the people.

"This (Importance of EoCI for RP) is something that I have not thought of before. But I think these are important"

"Devine merit, God given duty etc. are such a culturally integrated with what people do and believe and it is taken as a default thing. People don't usually sit and reflect how each of their activities are related to what you say (EoCI), if you know what I mean. For research, of course it is important and that they will consider these (EoCI), but it will be inherent. They won't sit and think 'OK, it is a God given duty' so I should do research perfectly. These things are implicit in the way people are brought up itself."

Question 3: Why do academics perceive there is AD?

Questions 3 and 4 were the ones which the respondents spent a long time explaining. Though the researcher tried to allocate equal time to each of the questions, the respondents on an average spent longer on these two questions than the other questions.

Initially, the academics asserted that there is AD prevalent in the institutions and that it is a common thing.

"100% there is AD."

"Few years ago, smoking was considered bad and people looked down on smokers, but then as time changed, occasional or social smoking was accepted, and drinkers were looked down upon. Now occasional or social drinking is seen to be common. Similarly, a few years ago AD was frowned upon, but now occasional, well – more than occasional AD is perceived as common in academia."

"One of the main reasons for AD is survival".

The reasons for AD was explained by the academics to be survival as there are many lecturers who are recruited and that it is easy to recruit academics. The concept of doing research for survival was repeated by the respondents seven times.

"Basically, it is a (About) *survival now, academics do PhD so that they can survive being an academic and (so) that it is a bit difficult to be fired. It also gives them a better salary, so what would they do, especially if they do not have research skills and are not given the opportunity to improve or learn research skills? They will buy. A lot of these academics see this as an investment."*

"So, for future survival, it is essential to focus on the research."

The reasons why the respondents perceived AD was clear from the interviews. The respondents stated that AD was seen at three different levels. They were at the academics /

staff level, at the institutional and at the governing bodies level. The responses will be arranged in the same order.

AD in the staff / academics' level: The AD at the staff level was about on them not conducting research properly, in terms of data collection, analysis, writing of the research, outsourcing their research etc.

"Academics want to increase their 'Quantity' of publications to compare it (Their own publications) with others. (A) Few of them (Academics) publish as if they collected data from some 1000 respondents without even designing any questionnaire."

"If you look at the institutions that have been started in the last 20 years or so, the academics mostly pay money outside and get their PhD or their research done."

"The researchers, rather than doing research by themselves, outsource it to their students. Now, a masters student does not have the calibre of a PhD scholar, so the results they produce for the PhD scholar or for the academic is not as good a quality as it should be. The one advantage of this is that at least you are guiding a student to do your work and some real work is being done, whereas if someone gets it done by a consultant, then they do no work whatsoever".

"This is a sort of a growing trend. They (Academics) use these people (Educational agencies/consultancies) for writing their thesis or for data collection or for writing a paper etc. there are a few educational consultants and if you approach them, they do it all for you 'A to Z'. You can just sit back, relax and enjoy the ride."

"A person sends (a) paper to one journal, waits for a few months gets rejected and then to another and gets for example accepted and will be published in another 6 months, but a (another) person who sends it to two journals at the same time which is not how it is done, gets accepted in one and rejected in another and so he publishes in a shorter span. The first person looks at this and gets frustrated."

The staff level AD was equated to the need for making money as was expressed by the academics.

"You should understand, these days, people who are in power, like a Head of the Department (HoD) or a principal etc., might have come to that position either through their network or by bribing, so they would want to collect that money back and to earn more."

"To publish in a top-quality journal, it costs you for instance Rs. 30,000. Three authors join and pay Rs. 10,000 each. After it gets published, they claim points / promotion for the publication in a top journal and get an increment of Rs. 24,000 per year. So, they get a return to investment by Rs. 14,000 a year and possibly a promotion."

"Such academics (Those who are dishonest) do not have a research culture and ethics and they usually publish in low quality paid journals, not in proper peer reviewed journals. But it (such actions) cannot be generalised."

AD was also due to how the current societal *system works.*

"Sometimes the academics who do not want to be dishonest, are forced to be, by the situation."

"Corruption that is prevalent in the society and within the management sets up a bad example for the academics."

AD at the institution level: The AD in terms of the institutional level included the institutions not paying the academics the proper pay, showing fake records for the number of masters and PhD holders as staff members, having more students than they should and bribing the governing bodies.

The institutions may not have the proper ratio of the different ranks of the academics (Asst. Profs, Associate Profs, and Profs.) and cheat the inspection committee by hiring PhD holders just for the inspection period as if these PhD holders are regular staff. This was repeated in total eight times by different academics during the interviews.

"Ideally, in an institution, if there are 100 assistant professors (The entry level position in South Indian colleges), then there should be around 30 Associate Professors and may be 5 professors. But in the self-financing institutions, they want only assistant professors as their salary is much lower. There might be 5 associate professors with the principal of the institution being the only professor. Again, this is to reduce the remuneration given to the staff."

"Let me surprise you more: There are some institutions which do not have any doctorates whatsoever, but the regulations say that there should be a certain percentage of staff who are doctorates. So, when there is an inspection, then they hire a doctorate holder just for the period of the inspection, create fake records that he (The PhD holder) has been working at the institution for a year or so. When the inspection is over, they get paid and they leave."

"There are a few doctorates, who do this (Being a hire for inspection) as their business. They do not teach at one institution, they are just a 'Lecturer during the inspection' travelling between many institutions. Even I got invited to a college asking me to work there for a day and that they will pay me Rs. 3,000 / day."

"If there is an institution that boasts excellent record keeping and documentation, then it can be easily said that they are involved in some fake data or manipulating the data. In all the institutions that my friends work they have all told me several times that they have been asked to create data out of nowhere or to manipulate the data to suit the institution's needs."

There are also swapping of academics between sister institutions for the inspection committee.

"If there are two sister colleges, then if one of the institutions has a committee (NAAC, NBA) visit, then the doctorates from one of the institution will be sent to the other, with a temporary id card and will be asked to work there until the committee is done with. Since the committee

visits happen once a year of once in two or four years, it becomes easy to shuffle the staff around just for the visits."

The following conversation showed the AD in the Deemed institutions.

Respondent 11: "Let me tell you something that might top it all. In the deemed universities (Not in the affiliated institutions). University Grants Commission (UGC, this is the top educational regulatory body in the country) might have given approval only for 60 seats (Students) in a course for an institution based on the facilities and infrastructure. But, they (The institutions) would have recruited 180 students or so, even though their approval was only for 60. When the committee comes for inspection – the institutions will show documents only for 60 students and will not show the record for the others. These other 120 students will study at the institution, will get degree awarded and will go out with a degree too. What do you say about it?"

Interviewer: Ahhh, now I have to check if my U.G. degree is valid or not. (Followed by a heartily laughter by both the researcher and the respondent)

A similar thing can be seen in the affiliated institutions, regarding enrolment of students.

"The students will be in some other state, or even some other country such as in working in Dubai, but he might need a Masters degree to get a promotion or incentives. So, he will register for a masters at the institution here (In South India) as a full-time student, but he will never attend any class, he will just come for the exam and write it. The institution will create a fake register as if he attended the college. This is not just happening in one or two institutions, but in a lot of them. Just imagine how professional the students who come out will be?"

"Main reason for hiring a PhD graduate is for showing the inspection committee requirement. If the UGC says that PhDs are not essential to teach in an institution, believe me, there will a lot of PhDs who are working today – be jobless tomorrow"

Sometimes, the institutions encourage the academics to write more papers by paying for them.

"The institutions have a different race. University X says to its staff, that the University Y has published 50 papers this year and so have a better grade, whereas we have published only 30. I (The institution) pay you (The academics) the same salary, so increases the target by one more paper for each staff per year. They (The institutions) say "If you (Academics) can pay for two papers, why not for three papers?" that is their question."

"Students in school are forced by their parents to score high grades, to be the best and to outwit other students in marks (Which the researcher can testify from personal experience), and now this has come over to the lecturers' level, in which the institution is forcing them to be more research productive and have better scores (For the ranking system) than the other institutions, but at the expense of quality."

AD in the governing bodies' level: The governing bodies are the AICTE (All India Council for Technical Education), UGC (University Grants Commission) and other NAAC (National Assessment and Accreditation Council) who are responsible for inspecting and accrediting the

institutions. The AD at this level was identified as them getting money and offering accreditation to institutions, not inspecting properly and getting money from a few journals to be in their recommended list.

The governing bodies were also stated to be taking money from the journal papers.

"If you send your paper to a reputed journal, it takes a long time to get published, but there are a few journals in the recommended list by the governing bodies that are paid and who are not that concerned with the quality of the publication. The governing bodies know that, but they still ignore this loophole."

"The governing bodies gets money from a few paid journals and including them in the list of recommended / approved journal list. In the span of the two years in which these journals are in the recommended list, they earn profit by getting money from the students and scholars publishing in them. Here again, the journal and the governing body are profited, but the quality of research published goes down."

The academics also stated that it is difficult for the governing bodies to control every institution as there are many of them.

"All the governing bodies know that it (AD) is happening, but the numbers are huge for them to do anything"

"It is very difficult for the Institutions to look at every detail at the Institutions where they go for inspection."

There was AD in terms of supervising PhD students too. In India, research supervisors are often called guides and supervision is often called guiding. This is stated so that the reader is not confused. The AD in terms of the supervisors is that they ask for money from the students and do not care about the students involving in AD.

"The guides want to show that they have successfully guided many students to completion, so they just 'Collect' students."

"There are many loop holes, in the university level, supervisor level. At the guide level, they say - give me Rs.2,00,000 and I will help you finish the PhD."

"The supervisors say "Who is giving me money to supervise you? I will finish off the research for you as soon as possible. So, give me Rs. XXX" It is difficult for the students to anything without the supervisor's signature. So, even if an academic want to be honest, and if he has a supervisor like this, it is difficult for him to be honest"

"The PhD supervisors would have bought their own research from outside, let us say that they have spent Rs. 2,00,000 for it and more money for the publishing etc., when he becomes a supervisor, how is he to earn the money back? Well, he asks his student to pay him either directly or indirectly. If you look at it, the supervisor does not get paid for supervision – so they expect the students to pay them. Again, difficult to generalise"

"If a person is a guide and has two students under him, he does not guide them but just pressurises them to publish - does not matter even if it costs the student Rs. 50,000, to buy it or to the students are expected to pay and publish the paper. In India, usually the first author is the guide, so he gets credit for a work that the student has paid for. Again, the guide is just looking for numbers, even though he is research dormant for years, just by the publications of the students it inflates his RP. The guide himself might have paid for his PhD or for getting the position at the institution."

"There is a hierarchy… there is a supervisor, then HoD and principal. We must be running behind the HoDs and supervisors and it takes weeks just to get a signature and I am waiting for her and they do not respond. They think taking time makes them better."

"Especially for a woman – they must go through the emotions of being a wife, of being pregnant, teaching and in addition I also must go through these emotions of unsupportive supervisor. These are some gender differences."

In conclusion, respondent 2 observed how there is a money flow in all these and ultimately how the students get affected.

"Look at this link between the two levels of AD: An affiliated institution should have two professors in each department and for that rank, they should be paid Rs.1,00,000/month. The institutions do not/cannot pay that amount, so they bribe the governing bodies or a person in high post there by giving him/her say Rs. 500,000 to create two professors/department in paper, but, there are none in reality. By this shortcut, the institution saves money and the person in the governing body gets money too, these affected are the students and those aspiring to be professors."

Question 4: How does AD influence the ORP of the academics?

The respondents stated that the quantity of research that is being produced increases because of academic dishonesty but the quantity or how genuinely the research is done takes a hit at the expense of quantity. So overall, it could be seen that academic dishonesty increases the overall research productivity but simply by creating low quality / junk papers.

"For sure AD influences RP negatively"

"AD does influence the RP of the academics positively in terms of quantity, but in terms of quality – it is very negative."

Again, the need for monetary incentives or making money came as one of the major reasons for academic dishonesty. Respondent 5 took a systems view of the issue and stated:

"The thing is, everyone needs money, the current Indian scenario is like that. Market force drives them all, the institutions, management, academics, students, well stakeholder. The institutions to survive need fee from students and the student choose institutions with good

placement and ranking, ranking is influenced by research, and so the academics are pressurised to publish without any resources being provided to them."

The pressure that the Institutions put the academics under without providing the necessary resources paves way for academic dishonesty.

"It (AD) increases the RP in numbers and not for the right reasons. Just due to peer and institutional pressure, nothing concerned with EoCI."

"The research quality is low because the faculties are not doing research because they want to develop some new concepts or something, just because it is a requirement from the institution which asks them to do so for the ranking."

"Under such pressure, I will be tempted to use a lot of shortcuts possible, ask my friends to include myself as a second author, go pay agencies to get it published. Your institution gets its name in the paper, its ranking increases but you are the one who paid the agencies."

"Currently, if you have a PhD and focus only on teaching, the management questions you "You are teaching well, but, so does a Masters graduate, then what is the use of paying you more?" The reason for this is that the institution can give 20 to 25 hours of teaching load to a Masters graduate, but for PhD graduate a maximum of 15 hours is given, so the management expects the doctorates to do other things. If an academic who has not done research properly is in this situation, then he will go back to being dishonest to publish."

On a contrasting view the respondent stated that there are a few Institutions which do not want their Academics to conduct Research and to publish paper because after finishing the PhD or after writing a few papers the Academics would want to get more salary which the institution would not be able to provide. The Institutions will not be able to afford these Academics.

"A few of the self-financing institutions do not want/encourage their faculty to do research, because they fear that with more research, the academics will start to demand more money and the institution would not be able to afford to pay them."

"Some of the institutions do not even want to take a PhD holder and are happy with just a masters graduate or even an undergraduate degree holder to teach as they are paid less salary."

"There are instances in which the academic even hides that he has done a PhD in order to get a job. It is sad"

AD influences the attitude of Academics and their colleagues in how they are conducting research currently and in the future.

"If once my dishonest paper gets published, from the next time onwards, I won't be bothered to work very hard for publishing, because conducting research is an arduous task so why to suffer, when you can do it the easy way?"

"Let me tell you an old saying. If you keep one rotten apple in a basket of good apples, the good ones rot too, not the other way around. Same thing with honest and dishonest academics".

"Corruption has now merged with the system. A few years ago, being dishonest in research was frowned at, but now it has become so common that people do not even think about it. If you do it once – you feel that you are doing a mistake, but if you do it on a regular basis, it just becomes what you do."

Academic dishonesty along with influencing their current research will also have a negative effect on how the Academics carry out research in the future. This is because they will still lack the skills required for conducting proper quality research

"Even after finishing the PhD buying it or partly buying it, they (Academics) will still lack the knowledge to conduct a proper research, making them essentially a person with a certificate, their survival in the future will be difficult in terms of research. Also, the research they conduct in the future will be of questionable quality."

The major point stated by the respondents is how AD within the governing bodies has resulted in the growth in number of institutions and seats available for the students which has in turn generated so many problems. This growth is seen to be having significant consequences for the academics and their RP. Initially it was not clear if was simply poor policy or AD on the part of the governing bodies, but the respondents stated that it was a combination of the both.

"More than AD, I would say that it is a bad policy-oriented decision to have accredited so many institutions without proper planning. Of course, there would have been a lot of money transactions in the process, but it has drastically affected the RP of the academics"

"Increase in the number of seats available in each of the institutions has become twofold, their staff requirement will also be two-fold to compensate for it. Because of this the new institutions, which are yet to establish themselves are unable to 1. Get students to join in their institutions and 2. Recruit quality research academics as they would demand more pay. This has impacted on the RP of the institution"

"A few years ago, institution 'x' would have only 60 seats available for example in Mechanical Engineering, and the rest of the students will select other institutions. But now, since institutions have been allowed to recruit 120 students, this takes away the quality and quantity of students who would have selected other colleges. This has created a situation in which the top institutions take twice or thrice the number of students they had before leaving all the newly formed institutions to fight for the students."

"One top level institution is now equivalent to what would have been three institutions. Only after all these seats are filled, people would go to the next level of colleges. This plan of

allowing the colleges to increase the number of intakes / seats has resulted in a massive blow to those (Institutions) at the bottom."

Whereas respondent no.10 stated the advantage of having more seats available in the top institutions.

"However, as a parent I would want my child to study in one of those top institutions as they have better faculties and facilities not in the new institutions, so as a parent, I think the increase in the number of seats in each of the (Top) institutions is good."

The respondents criticised the increase in the number of institutions as affecting RP.

"Imagine if you own one of the bottom institutions in which there are totally 120 seats in Mechanical Engineering and you get only 22 students in the classroom. As the college owner – realistically, how are you going to focus on research, or recruit high calibre staff, set up research facilities etc.? "

"These are the institutions fighting for survival with minimum resources (Students), when they are operating at a survival level, they will easily resort to unethical activities. Well, I guess in their shoes, most of us will do that. If there is less recruitment, what can the institution do for research? They won't, they can't "

"If they have at least a 50% admission, they might be able to survive, but if they have 30 or 40 % of the intake, - they cannot switch off the lights or fans or AC or not pay the drivers or close the labs etc. The only people that they know that they can bang on are the staff members."

"Initially, the governing bodies should not have increased the number of seats per institution and should not have accredited or allowed so many institutions to start in the first place. There was a lot of corruption and lobby in that itself."

"Even if all the students who finish engineering get placed / recruited in organisations, then it is understandable that more institutions are needed, but there are a lot of students who do not get a job after the course so there is no need for more institutions to have started."

"At least now, the governing bodies looking at the plight of the lower order institutions should decrease the number of seats in the top institutions so that their survival becomes easier and that they can raise to focus more on research. When they have more intake, they will recruit better staff, and better facilities which will improve the results."

"The increase in the number of seats and the colleges are two of the major reasons for all these issues."

"So, even if one person starts an institution with a noble intention, they are unable to keep it up for survival reasons."

"Apart from affecting their RP, it affects their sense of being an academic. A lot of academics in the lower strata of institutions are losing their sense of being an academic and few of them have left or been fired from their academic position due to the low intake and they have left academic profession and started food business, or milk vending etc. and usually they get paid more than being an academic."

Overall, it was clear that the increase in the number of institutions has resulted in a gamut of problems for the RP of the academics both directly and indirectly. This may have been avoided by the Governing bodies if they had approached expansion differently.

Question 5: How to decrease AD at different levels?

Encouraging those who want to conduct research and not forcing everyone to do research was stated by the respondents as one of the ways to reduce AD. Those who are not interested and skilled in research are the ones who supposedly/ more likely to engage in AD. So, by encouraging those who want to conduct research and by training the other academics to conduct research could be a good method to decrease AD.

"At the academic level, the institution should not ask everyone to do research, but just encourage those who are interested to do it, thus making sure no undue pressure on people and to do fake research."

"Selection (of academics) must be made on merit basis, not recommendation basis or by paying money."

"Selection process for promotion must be much more stringent based on the quality of publication and based on merit."

"You cannot force everyone to do research, only the result will increase the number(Quantity), without any proper result (In quality)."

"The quality of staff members has not been considered and it should be, especially in the newly formed institutions."

"They (Academics) do not know how to write, so just copy and paste, plagiarise without even knowing that (it) is plagiarism. They need to be taught properly."

Proper pay for the academics was a major point stated *by the respondents that could reduce the AD both in the institutional and the academics' level.*

"Proper salary should be given to academics, according to the norms. There are some institutions that pay less than Rs. 10,000 to their academics, to put it in perspective, a person with just a 10th standard education (Eqv. of GCSE) working in a petty shop, or in a construction sites earn more money than this. How are the academics to survive and how are they to take pride in being an academic, working for such a low salary after having graduated in Engineering, which is supposedly a high earning profession."

"There are institutions they pay their staff less money as wages than what they say they pay on paper. There are many occasions in which the institutions do not pay the staff salary for 3 to 4 months altogether. How can an academic with a family that too in a city like Coimbatore

survive for a few months with no salary and having to go through pressures at the institution and on top of all these – having to do research!"

"The management wants the staff to do more and not pay them the proper pay. This is dishonesty as they pay less than the amount written on the official paper. These academics will be more vulnerable to be dishonest."

The academics working in the newly formed institutions face a lot of pressure and more workload compared to their peers in more established institutions, reducing what research time if any. They might have. The academics are made responsible for even bringing/recruiting students to the institution!

"Imagine being a staff in these (Newly formed) institutions, obviously there will be no job security, will have more work to do as the institution cannot hire a lot of support staff and you get to teach those students who have just scraped through – not to forget you have to make sure you increase the pass percentage teaching these students!"

"Being a staff in these institutions, even recruiting the students has been made a staff duty. I am not talking about the exhibitions or the fairs, I am talking about directly canvassing the students by going to their home!"

"Until a few years, if a staff recruits one student whether his relative or anyone else, then the academic will be given a small monitory (Financial) *incentive. But now, the scenario has changed from Staff 'Getting an incentive' if they recruit a student to that it is 'Expected' that they recruit to now being that staff 'Should' recruit a certain number of students or else they do not get their salary for the summer vacation month! So now the staff go canvassing in peoples' homes looking for potential students and often exaggerating the facilities they have. This has taken away the sense of being an academic."*

"It is creating a cycle that drags down. The new institutions are unable to get students as they are yet to establish themselves as a quality teaching and research institution - so they make less money - because of this they cannot recruit good academics or set up labs or pay the academics properly - so, the quality of academics is low - this further decreases the quality of the institutions – this results in lower recruitment of students next year and so on."

Even though the educational agencies have been explored in the previous questions, this was repeated here to reduce AD.

"Research has now become a business, I am sure you know about the 'Consultants' and their shops that have developed. If you go to these shops, they will do everything for you, right from choosing the topic to selecting the guides, selection of title, saying what is the recent trend, help you with your coursework, they will prepare papers for you, publishing in journals, synopsis writing, choosing the members for the examination panel and even preparing the PPT slides for you for the viva, explain the slides etc. they will do it all. All that

you must do is, just to go and stand there as a person. You can choose to do a few little things in the research if you want, or they can do it all. This should be minimised or stopped."

The respondents stated that the Governing bodies should improve their inspection process, their expectations from the academics' publications and increase the eligibility for starting a PhD by conducting entrance examinations.

"If the punishments for AD are severe, then people will reduce AD to a certain extent."

"At the governing bodies level, there should be strict entrance exams that should be conducted for the academics who wish to pursue their PhD. This will tend to filter out the not so eligible candidates and thus the quality of research will increase. Or else selection should be based on some grading criteria, for example: Distinction in UG gets a certain mark, PG gets a certain mark etc. and to limit the places for PhD."

"The governing bodies should improve their standards, saying that you should publish only in free journals, your research should be of a certain quality etc., when these bodies understand that the quality of research is going down, they should do something about it, they have not."

"Another thing the bodies should do is to form a panel of inspectors who check if any PhD has been bought and if proven, they should cancel their PhD altogether. This will create a fear in the minds of the dishonest people to be more ethical. When the AD starts to reduce, EoCI's importance starts to increase."

"So, in terms of the documents and the documentation the institution and its staff members are performing excellently but no real research is happening. So, the governing bodies just look at the documents and even though they know the reality, they write their report based on the documents submitted to them. The people who gets affected by this are the students."

There were other respondents pessimistic about reducing AD.

"I am not sure about how to decrease AD at the management level. I am not sure if it can be done."

The other points that were stated about reducing AD were:

"If politics seeps into academia, it is very difficult for it (decreasing AD) *to happen."*

"If you see carefully, most of the institutions are owned by politicians or their benamis (For example, the Uncle or the wife of the politician might be the owner of the institution on paper, but in reality, it is the politician who owns it completely)*, who see education as a business to make money and, so they are interested only in profit. Not sure if it can be reversed, but commercialisation of education should be controlled"*

"Very little of the engineering research that is being conducted is applied research, something that can be used in industries. Because of this, the industries are not interested in funding the academics. So, rather to the academia informing industry what to do, it is the other way around now – industry informing academia. But with more industry linkage and doing research for them, the probability of AD will decrease."

Question 6: Has and how has the new ranking system of the Ministry of HR Development of India (MHRD) created a need to conduct research?

This question was asked because when the quantitative questionnaires were given out the ranking system had not been implemented and, so it was essential to know how this change that has been in place since 2015 and has influenced the research productivity of the Academics. Consequently, there is no quantitative data on this element and it is explored only qualitatively.

The respondents were divided in how the MHRD ranking has influenced the RP of the academics, some stating that it has increased the RP and has given a framework for the academics to work to. Whereas, the others have been critical in that it has just increased the pressure to publish even if they are not skilled, increasing AD.

The positive effect of the ranking on the RP are:

"It has helped me to think in a broader sense to see what I can do to increase my API (Academic Performance Indicators. This is similar to Research Excellence Framework (REF) scores in the UK) *score, can I do cloud computing, can I merge electrical and computing engineering etc. Especially Coimbatore has now been named as a 'Smart City', so I have started to look at how to get a grant, what are the key words, etc."*

"It has increased a bit of awareness towards research and the institutions have started to ask their staff to conduct research. In the future, I think that this will increase the number of research conducted at least for the sake of getting a better rank."

The respondents voiced several concerns with the ranking system. They also stated the ranking system should emphasise more on the quality of the research, rather to the quantity:

"I don't know how much it (The ranking system) *has increased RP in terms of quality, but it has increased the rat race* (Of quantity). *The MHRD ranking is one of the major reasons for*

this rat race. It has influenced the quality of research may be by 5%, but in terms of quantity, it has influenced by more than 50%."

"This (The ranking system) rather to encouraging and motivating the academics to conduct research, makes them see this as an additional thing to do which even if they are not skilled and are being forced to do."

"Before the ranking system, our job depended on the pass percentage that we have, but after the ranking introduction, our job depends on both pass percentage and publishing."

"If you look at most of the publications by academics in Coimbatore or in the south (India), *it will mostly be* (in) *a paid journal, that* (On its own) *talks about the quality of the publication and due to this the ranking of the institution in NIRF will decrease."*

"I do not think that the raking has done any major change to the research by the academics. By doing the bare minimum along with the loopholes, the NIRF has just become another exercise to do rather to a reason for a real change."

"When people must do something (Research) *that they are not trained for under the pretext of job security, AD will prevail. The more the management pressurises,* (the) *more AD* (there) *would be. It has become a job security issue now, thanks to the ranking system."*

"API score is the ones that the governing bodies are looking at. But I can have 10 publications in low impact paid journals, and the API scores does not take that into account, so there is a flaw in it."

"The ranking system since it emphasises quantity (means), there are more chances tor AD."

The respondents stated that the institutions should use the ranking system to set a long-term goal and to train the academics based on it to get high ranking, rather than asking them to publish for short term benefits.

"The management comes to you one day and says that we (The institution) should have a good ranking next year, so we need more publications. How is it possible to jump from no to little research to a high ranked institution in just a year – that too with minimum investment from the institution for research? It can be only done step by step gradually."

"The management should form a long-term plan to increase the research and (it) *should not be seen as something that can be done in a short time."*

The respondents also linked the newly formed institutions and the influence of the ranking system on their RP.

"From an institutional point of view, they want more student intake so that they can earn more money, to get more intake they must improve their ranking. The current ranking system requires that the institution to publish papers. So now along with having to make sure the students have high pass percentage (Another requirement for ranking), the academics are also required to boost the institutions' ranking by publishing papers, unfortunately the institutions have not made any additional provisions for conducting the research."

"In the newly formed institutions, there is no concept of research and they do not encourage academics to conduct research but want publications to improve the ranking."

"It is very difficult for the new institutions to get any benefit out of this (Ranking system), they do not have money and would be reluctant to recruit good quality staff with reputed publications due to salary issues, and so it is very difficult for them to improve their ranking. It will take them a long time for them to even think of it."

Question 7: What are the changes at different levels that should be made to increase the RP?

The respondents stated that by exempting the newly formed institutions from the ranking and by helping them to build a research base would be very helpful.

"In the new institutions, there is zero motivation for research, think of it, they are operating on a survival basis, they do not have enough enrolments so how are they to focus on research which is higher in the pyramid? So, they should be trained and be exempt from the ranking system for say the first five years or so"

"One way out would be for the ranking system to be altered so that the newly formed institutions are exempt from research for a certain period. So the policy must change."

Distribution of workload for academics was suggested should be distributed if they are conducting research or not and based on the gender.

"The institutions should distribute work load according to the type of academics. If someone is interested in research and conducting research, then they should be given less teaching time and more research time and vice versa."

"Female faculty should be given more time or less teaching load when they are doing research. India being a more traditional country, taking care of the family, the children, the elderly and the chores usually fall on the female. So, it is very difficult for them (Female academics) to pursue a research career even if they want to. This is not so much of a problem to the male academics."

"Female academics if they are burdened with teaching load whilst in college, then it is very difficult for them to do research. Just pressurising them won't work, proper support mechanisms should be put in place. One more thing to note is that the institutions are usually one to one and a half hours from the city each way. This wastes their time too."

"They (The academics) *should be let free and be given less teaching and administrative work. If you constrain a person with strict time limits, then they will obviously look for shortcuts."*

The changes in terms of the governing bodies that were suggested by the respondents are:

"If you (governing bodies) *tell the institutions that they should do research and publish in a certain ranked journal and if not, tell them that their affiliation will be cancelled, then more research will come out. But, this is threatening them to do research."*

At an institutional level:

"Each institution should form a research team or two with academics who are genuinely interested in research, those who have guideship, with good publications and they should be given a target every year to publish so many papers or a score in the API or NIRF scale."

"The Indian academics and the institutions look at the western countries where research is held as the helm (Top standard) – *Indian academic system wants to mimic them,* (thus) *creating all these issues. It does not mean that Indian academics should just focus on teaching, but the concept of creating an environment of forced research has emerged from this… that is the issue that must stop."*

With reference to increasing the research productivity of the academics most of the points that were raised in response to Q7 were very similar to those for questions 3 4 5 and 6 but the other way around: For example, saying that the institutions should set up proper research facilities, train the academics in research, not force the respondents to conduct research just for ranking and to provide proper supervisors. But a few of them were pessimistic in saying that it is very difficult in the current situation to increase the research productivity of Academics. Since the points were being repeated, they have not been included in this section.

Question 8: How do the institutions in general motivate the academics to increase their ORP?

- Does it work?

For this majority of the respondents spoke about some sort of monetary incentive or promotions that are based on the research the they are conducting as the method that Institutions are using to motivate the academics currently. This point was repeated by all the respondents during the interview. Some of them stated that this is not a very good method and that some other alternative method should be formulated but they were not sure what an alternative method would be.

"The management is thinking of these rewards as positive, but a good researcher who wants to do serious research gets demotivated when looking at academics (who) *publish papers of low quality* (Journals) *or by dishonest means get incentives."*

"By giving them incentives…Indian society has evolved so much as to see money as almost everything."

"Promotions and incentives – I am not sure is a good method. It is just like creating a race, your colleague has two publications, just like you, so how to differentiate yourself? Your colleague is supervising three students, you only two… so this is how it goes, a never-ending race."

"They are also asking the students to do research. Promotion and increment are the two major methods they use to motivate the academics, but this has resulted in a motivation through dishonest means to get the rewards."

"Some other alternatives should be found for this (Motivating the academics to increase their RP)"

There were instances in which the academics misused the incentives system.

"There are academics who misuse the incentives system. If an institution announces that an incentive of Rs. 2,500 / paper, then these academics publish their paper in a paid journal for Rs. 1,000, get the incentive of Rs. 2,500, essentially getting a profit of Rs. 1,500."

One manager said that people (Academics) who are really interested in doing research will and should do it no matter what, no matter if they are given incentives, or free time etc. they should be motivated on their own and do research work in the weekends or when they are free.

"Nondi Kudhiraiku valukkunadhu saakku" which can be translated to something like a bad actor blames the stage.

Question 9: Should the institution do any particular thing to increase the ORP of academics?

Few of the suggestions given by the respondents include:

"There should be a change of thinking towards research from all the levels: the academics, management and the governing body level that can increase the RP of the academics."

"If the institutions force everyone to do research, this is what will happen. Instead, the institutions must train them, create a research oriented atmosphere in the institution, be ready to support both in reducing teaching load and giving time to conduct research etc. with such an environment, people will automatically start conducting research."

"If the institutions motivate those who want to do research, it is good."

"Cash awards and giving an identity, incentives can be used. Depends on what the staff want."

"Industrial experience is not taken into consideration for promotion, only academic experience is. So, when an industrially experienced person wants to join the institution, he will have to start as an assistant professor and for a much lower salary than what he was earning in industry. This discourages people with industrial experience joining academia."

"In terms of the institution, it behaves like a typical Indian parent who always compares their child to that of their relatives or neighbours' children saying things like "Look at your cousin, who has scored high grades, or won a competition, and what are you doing"? similarly the institution says to the academics "Look at your fellow academic who has published 5 papers, what about you"? I would say that this has something to do with the Indian mindset. Right from a young age – we have been driven by quantity, and it is difficult to change it."

"Only when the academics are satisfied with their basic needs, they can focus on things like service etc., but they themselves are not sure if they would have their job next month or not, so it is difficult for them to do research with such a moral thought. So, they should be given proper job security"

"There should be more transparency, all the institution related documents should be online, including the staff and the students. Fake or 'Documented lecturers' should be identified and punished. The frequency of inspection should be increased. Staff members should be involved and consulted during the inspection."

"Reduce their administrative work. Academics are recruited for teaching and research, not for doing paperwork. If the management needs someone to do paperwork, they should hire clerks. There is a lot of paperwork that the academics must do that you won't believe it. This is eating too much into both teaching and research time of the faculties."

"In a few years, even PhDs will become like masters or Batchelors. At that time, academics will then be distinguished by the number of papers, grants that you (They) have, etc. When a person is not skilled in research, this might increase the number of paid and fake publications. So, the institutions should start investing in the research infrastructure."

Question 10: Do you think that engineering academics in Coimbatore consider conducting research is important?

This was intended to be a finishing question. The responses show that only a few of the academics think that it is important to conduct research for internal factors whereas most of them conduct research for external rewards.

"Very few, very few academics really want to do research".

"They consider it important, yes, but not as they are interested. Fifteen years ago, if you just had a B.E., that was sufficient for teaching, but then when a lot of people graduated B.E., people started to do Masters to distinguish themselves from the crowd and for having a better chances of survival. Whereas now, there are a lot of Masters graduates, so to do the same (Distinguish themselves and to better survive), academics are doing PhD or conducting research."

"Not everyone, but at least a few of them are interested and think that conducting research is important"

"There is a certain amount of stress involved with doing research and the academics who really enjoy that stress, have good links with academics worldwide or at the top institutions, interact with them to develop their skills."

"Not at all, they (The institutions) are more concerned about money, running the institution, and admissions. When they are thinking such, research is something alien to them. If they more out of that basic level, then they might consider about research."

"One thing is that there are two differing views about the staff at these institutions. First is that these staff's potential is being wasted and that they have less opportunity to conduct research or to develop their research skills. Another view is that these staff themselves do not have any research skills or interest in research and just get into teaching as they are unable to find a job at the industry and are looking to fill in the gap by working at these institutions. Such academics would not think of research or its importance."

The respondents also stated that the academics do not think conducting research as important because they are not aware of its relevance. The respondents also linked such thoughts of the academics to the academic system that they have come through and what it sees as its priorities.

"Indian academics have come through a system that has not emphasised research but teaching as a major goal of education. These academics who have come through this system do not focus on research."

"Indian educational and the cultural system has always emphasised teaching to be a noble profession, it does not talk about research, the concept of having to do research has come to be a pertinent thing only in the last decade or so."

Do you have any other points that you wish to share?

The respondents stated that the educational system right from the elementary school is something that has resulted in how we see research.

"If you go to the basics of it all, you will find that the educational system right from school is not good."

"Our educational system emphasises on getting high marks, not understanding. A student might know the subject as it says in the book, but there it stops."

"We do not encourage critical thinking, application and analysis. This has created students who merely learn a subject for exams and believe what they learn is secluded from everyday life. Also, the system only provides lip service to letting students ask questions to the teachers."

"The schools are just teaching the students to memorise the subjects and to get high marks. So, the students don't really understand the subject but just get high marks. The parents also just expect high marks. The parents are not bothered if the students really understood the subject or not, they are just concerned about the scores they get. When these students with high grades come to university, they (often) *fail in the first year."*

"When the students are just passively absorbing what the teacher says right from a young age, they are conditioned like that, when they become academics, their conditioning impedes them to question and to critically think – two of the pillars of any research."

"Now, these students who have now become faculty members, and now when they start to do research, they lack the skills to do independent research and struggle a lot. To publish, do a PhD etc., it is very difficult for them, so they adopt dishonest ways to publish and be promoted." "These are the people who are also supervising other PhD students! Thus, something that starts from a young age has such a massive influence in the entire educational system."

"The culture of memorising the subjects for marks and not understanding it has spilled over from schools to HEIs too. Since the parents look at education very quantitatively, they support it and like it too."

The respondents also spoke of the power distance between the teacher/supervisor and the student.

"There is a power distance between the students and the teacher and it is widely believed what the teacher 'Guru' says is true, because he said so. This thoughts spill into the Higher Education too, the students study for marks and lack critical thinking."

"In Indian culture, you do not speak over or disagree with elders or people of power, we are just taught to respect the elders and listen to them just because they are more experienced and are older. This is also influencing the mindset of the people whilst being an academic or being a researcher."

"Such thoughts of obedience ranges to even longer period, when the kings had unquestioned authority over their subjects, the subjects were just expected to follow what the king says."

"During the British rule, except for the 20 to 30% of the people who fought for freedom, others were being obedient to the British who were stronger at least in military. Later with the Zamins (Eqv. of an aristocrat) and the local landlords enjoyed such power and now the politicians. So, perhaps our society has evolved to be like this. Even before all these, except for Buddhism and Jainism the other religions in India just ask their followers to believe and not to question. So, power distance and acceptance of what older people say is something that has evolved with the Indian culture for centuries. In your research, you are just seeing an effect of it in terms of research."

"The power distance between the supervisors and students is even miles wide when an academic is pursuing his PhD. Here the student (Academic) *does not question the supervisor for both not offending the supervisor and the early conditioning that they have had. The supervisors rather than bringing down the distance, relish being in a stronger position of 'Unquestionable authority' over their research student."*

"I remember for my PhD when I disagreed with my supervisor on one thing, he asked "Are you the supervisor or is it me? Who is it that is going to sign your PhD off?" and that was the end of the conversation and I did what he asked me to do. It is possible to fight, complain etc., but Indian culture is more of a conflict avoidance society."

The stagnation of job market, the availability of the graduating engineers exceeding the requirement of the employers were stated to be a major result of the increase in the number of institutions.

"Self-financing engineering institutions were started as they were considered a safe option of constant profit, as the population is high and young the supply of students was assumed to be constant. But the trend has changed due to the stagnation of the employment market for engineering."

"Even mechanical engineering, which is considered as an evergreen field for employment has stagnated, resulting in students opting to study easier courses such as arts or history rather to toil with all the mathematics involved in engineering."

"One of the main reasons for the problem is because of the unplanned and spiked up growth of the private HEIs."

"Few years ago, there was a hype in the society that if you finish your engineering, then you can have a good future. But the hype has decreased now as there are less job opportunities for engineering graduates. It is also due to the unawareness of the society as well, they thought that everyone doing engineering will get a job, they just followed the mass."

"In the future, the intakes in premier institutions will increase and the lower strata institutions will perish, the academics in there will have to find a job in a better institution."

How this stagnation of job market in turn affects the institutions was stated by respondent 3:

"The reason why there are a lot of lecturers is that…An engineering graduate, wants to work in a company after finishing his degree, but when he is unable to find any job, rather to being unemployed, let me work with this institution teaching students. Rather than being anti, I will just go with the flow so that I get paid every month. It is not because they want to be an academic. How can such academics consider conducting research as important?"

The ways in which the institutions try to increase the number of students joining them were also stated.

"One of the ways in which the institutions countered the unavailability of students is by recruiting students from the nearby state of Kerala. Few years ago, Kerala students made a considerable population of the student numbers here. At least 10 institutions were started in hopes of recruiting Kerala students, but now Kerala itself has increased the number of engineering institutions and so there are very few Kerala students coming to study in Coimbatore."

"Recently, one of the ways the institutions are tackling low number of students joining their institutions are to lower the tuition fee. The government set fee is approx. Rs. 50,000/year. But these institutions say that they will offer it for Rs. 30,000/year. Thus, a lot of students join here for the lower fee. For the institutions, it is better to have 60 students paying Rs. 30,000 each than just 10 of them paying Rs. 50,000 each."

"Unplanned increase of institutions and seats. A few years ago, people were interested in engineering, but now they see other engineering graduates with no job or working for low salary etc., so they are no more inspired to study engineering. This is due to the job market slowdown. So, the students want to study arts and science courses which are easier compared to engineering."

A major theme that came out of the interview was the link between the AD and the EoCI:

"The EoCI is inside the hearts and thoughts of everyone who start their research or their PhD, they want to do proper research and publish in unpaid journals, want the results to be useful to the society etc., but the AD factors, their environment and their situation consumes the EoCI factors and makes them to be dishonest. For example, if I start PhD with another colleague, he publishes in paid journals and seeks the help of all these agencies and I don't, then he will hand in his thesis earlier and have a few publications in his name."

"Since the good journals take a long time to get published, you should wait a year or so to get published. This means that the other person would have more API scores and would move onto a higher position and you being an honest person will still be loitering around. This unfair situation makes me to think that if I am so honest, then I won't develop, so I turn

to dishonest practices. Let me tell you in one phrase "Be a Roman while in Rome". Alas, being a Roman here is being unethical."

This section of the chapter has given rich data on the various elements of RP, the factors influencing them and how to increase RP and to decrease AD. The chapter has gone beyond the quantitative measurement of the above factors and has:

1. Described links between AD and EoCI,
2. Links between AD and the increase of institutions,
3. Links between AD and the cultural, educational system in the country and policies formed by the governing bodies etc.
4. It has also showed the reasons for AD, the various AD at different levels and how the current research environment could influence the future academic system.

Appendix 3: Interview with the educational agencies:

This appendix is a part of the chapter no.4, the results. It summarises with quotations of the interviews from the agencies.

1. **Why do academics go to these agencies?**

The first question was to understand the perspective of the agencies on why the academics go to them rather than doing research on their own. The respondents stated the lack of research skills as a major reason for approaching the agencies. Some of the excerpts from the interviews are:

"The academics go to these places because they want to do their PhD, or write a paper and that they either do not know how to do it or they need help for doing it. The academics approaching these agencies lack research skills, and when they must do research, they go to these agencies"

"The academics have less knowledge about research. In most of the cases they don't have a clue about what to do and how to do it. All that they know is that they either have to finish some sort of a PhD or write some paper".

"For doing research in engineering, it is important for the staff to have a good grasp of the applications of engineering principles, programming or statistical software, applications of mathematics and some fabrication. The staff (Academics who come) *here lack in all the four".*

"The staff comes to us wanting to do a PhD in electronics, but don't even know to write a simple programme in C. The sad thing is that they don't want to learn it. They seem to know only what is in the syllabus and if you ask them for something apart from it, then they struggle".

"For writing (a) thesis, their writing skills are not very good, that is why they come to us (Agencies). It might be that they studied in Tamil medium schools (Schools where all the subjects are taught in Tamil, a South Indian regional language) *and that their English is not so good".*

"They lack the writing skills and the language skills. So, they ask us to write the synopsis, the thesis and the paper. They are unable to comprehend literature and to know what it says".

Getting higher pay was another reason stated by the respondents for the academics approaching the agencies.

"The reason the academics do a PhD or write papers as they want to get higher pay, knowledge and service oriented thoughts are just secondary" (This point was repeated three times in total from both the interviews).

"A PhD graduate will be paid at least 2.5 to 3 times the salary of that of a masters' graduate, so by finishing a PhD, it changes their worth."

Unsupportive research supervisors were cited as another reason. They usually supervise part time PhD students who are full time lecturers at an institution, there is a huge power distance between them. The respondents also stated that the supervisors or the research head recommends an agency as they would get a commission for it.

"When a researcher approaches his seniors or his supervisor with a problem and asks them to guide him, then the supervisors are scared that 'Ough no, he has come with a problem'. Some supervisors assume as if they are sitting in a high throne and don't treat their students with the proper respect (Which the author has observed). When the researchers themselves are unable to do it and their supervisors don't / can't help them – then the researcher starts to outsource their work"

"A few of the times, it is the Head of the Department (HoD) who sends us the students".
"The supervisors are usually busy. They would be usually in a senior position at the institution where they work and will have a lot of administrative things to do. So, they have less time to interact with their students"

The power distance (Hofstede, 1984) between the supervisors and their students was cited as another reason by the respondents.

"Most of the times, there is like a few kilometres of power distance between the supervisors and the students. They (Supervisor and the student/researcher) might be in different institutions. So, every time a PhD student wants to meet the supervisor, he must take time off from the institution and go. Very few supervisors really help their students. Most of them (Supervisors) try to maintain a halo on their head by just scaring their students"
"The PhD students don't often go to ask the help of their supervisors for fear of disturbing them".

Similarly, lack of time or interest to learn new software, or new methods and skills was cited as another reason for the staff to approach the agencies.

"If people do it on their own, it takes a long time to do it and they lack the interest to learn new things. The academics want it quickly, so they come to us. Quick publications can be done only in paid journals".

Overall, it was evident that the academics who go to these agencies lack research skills to various degrees and that they want a quick fix to compensate their shortage of skills and thus approach these agencies to buy what they should conduct on their own. As well as the lack of skills, academics also go to these agencies as they have unsupportive supervisors, who themselves lack skills in research, power distance between the researcher and the supervisor. The most commonly reported reason for conducting research was the pull factor/prospect of getting a huge salary rise a PhD degree will give them. The academics also get incentives for publishing and even for that they approach these agencies.

2. How do the agencies do research?

The researcher was interested to know how it was possible for the agencies to do so many research projects at the same time whilst the academics struggle to do even one. This would shed light on the workings of the agencies. The replies showed that the people working in these agencies usually have only an under-graduate degree, and it is just by practice they are able to do the research. Regarding the qualifications of the people working in these agencies, the following quotes give a good introduction:

"I only have a Batchelors in engineering (B.E.), *I don't even have a post-graduation, but I have done projects for several post graduate students and for PhDs as well. If I want, I could have got a PhD already, well four PhDs so far!".*
"The people who work in these project centres are just recently B.E. graduates. The managers in the project centres pressurise these people to learn very quickly so that they become a productive workforce. The graduates use this job as an experience to jump to their next job. It is not that they want to stay at these centres forever, until and unless they want to start a project centres of their own".

The following conversation between the researcher and respondent no. 2 clearly shows how these agencies work and the level of Academic Dishonesty (AD). The agencies suggest a range of similar projects, with overlapping literature and (Computer programme) coding to the different academics who come to them, thus essentially making their, the agencies' work easier. Even the coding used for the projects is downloaded from the web and modified.

Researcher: "How is it possible for a person working in one of these agencies to do three or four PhD level projects or write papers at the same time while an academic "finds it difficult to do just one?"
Respondent: "Let us say two academics approach the agency with no idea, then the agency would suggest the first academic a title like 'Optimisation of temperature in an office room' and to the other academic they suggest a title like 'Optimising the temperature of a classroom'. So basically, these are the same projects, same computer codes etc. but with small changes in the parameters. This is how you to reduce the work load. It is difficult to do two or more completely different projects at the same time. The project centres are not doing anything extraordinary. If someone has used two sensors, then you use three sensors, that's it."

A major point to note is how the agencies collect data for the research they help with 'On behalf of' the academics who approach them. When the researcher asked them how it was possible for them to collect data for three to four research at the same time, they responded by saying that they just make up fake data according to the requirement of the academic. This was stated by both the respondents, the academics and managers alike in their respective interviews. The following conversation highlights this issue:

Researcher: "How do the agencies collect so much data? Conduct so many experiments? For my PhD, it took me 5 weeks and a lot of visiting different institutions to collect 600 questionnaires. How does the agencies do such a tedious task?"
Respondent: "Hahaha. Who collects real data? I would definitely say that 95% of the data 'Collected' by the agencies are just made up values depending on what the researcher wants the results to be".

The *other respondent stated:*

"Mostly the entire data for analysis will be downloaded from the internet, because it is not possible to create all these data out of the blue. The downloaded data will work fine for the model created by the author who uploaded it in the internet, but it will not work for the requirement of the researcher, so just modify it".

Both the respondents stated that the data for engineering and social research were just cooked up by almost all the agencies. They stated that it is physically not possible for an agency, which might be run by two to three people to do real field work, perform all the experiments and collect real data. They also added that the lecturers know that the data is not real – but all that they want are the results. Sometimes, the entire data is not fake, only the data that does not fit the hypothesis, are changed to get the desired result.

"The academics come to us and show a graph from a book or a paper and ask us to create a similar curve with their data. The curve in the book would be an ideal curve and real-time data would not match it. So, either them or we will have to change the data so that the data fits to their requirement. The supervisors also ask their PhD students to produce an ideal curve, it is very difficult to do so in real time"

The respondents also stated that the academics who come to them leave it till the deadline is near and then rush to these agencies as a last resort for them to be able to hand in the results, or thesis or the paper. Both the respondents stated that if the academics had come earlier, there might be a possibility that better work could have been done, but then they are always late. This is seen from the following conversation.

When questioned about plagiarism as the data and the computer programming coding are being downloaded, both the respondents assured that they check thoroughly for plagiarism with a professional software and that none of their clients or those that they know of who bought their research from most of the centers have been caught for plagiarism. They added that even if someone was caught, the academics themselves will hush it up and not publicise it. Perhaps they might have a private conversation with the agency who will rectify it for them.

"The accepted level of plagiarism for a PhD thesis is 15%, sometimes the academics bring us a few chapters that they have written themselves and it is full of plagiarism. Rather than correcting their plagiarised work, it is easy to write one on our own, as we can assure that we will produce work that is less than 7% plagiarism".

From the interviews with the academics and the managers, it was seen that the agencies are well connected with journals. The researcher wanted to get more detail on this from the respondents. Even though the first respondent was not sure about the link between the project centers and the journals, both of them agreed that such things happen.

Respondent 1: "We do not have any links with the journals, well at least that I know of. But a few agencies have links with the journals that are published locally. If you go to bigger cities, it is not uncommon that some of these agencies they themselves or their relatives have a journal 'Supposedly an International Journal' that they will easily publish in. But, there are a lot of paid journals that do not care what they are publishing, so there is no real need of having a link with a particular journal".

Respondent 2: "The project centres are mostly connected with the journals. They act as middle men between the academics and the journals. This is how it is done: you pay the centres, they take their commission money and pay the journal some money".
"In terms of publishing, there are two types. 1. The centres just write the paper and give (it to) *you* (The academics). *They do not take any responsibility for it to get published or not. 2. The centres will make sure that they send it on your behalf and that it is published. The second option is more expensive and can cost around Rs. 100,000 to 150,000* (1 GBP approx. eqv. of Rs.85) *for one paper".*

Overall, it could be seen that the data is mostly made up or simply downloaded from the internet, making the results to be of very little use. As one of the respondents questioned: *"Who are these results useful for?"*

Also, the relation between the journals and these project centers/agencies are evident.

"People who do research/PhD for monetary causes, or those who have low research skills, are the ones who come to us. If someone does research for internal motivating factors, such as the EoCIs, or if they know how to conduct research, then they will not even come to us".

3. What is the perception the agencies have of themselves and of the academics?

From the interviews it was seen that the agencies look at this as a business and do not associate themselves with AD. To them they are doing a service for which they get paid. As one of the respondent stated:

"We exist since there is a demand. If the academics did it all by themselves then we would have to do something else. At least in the near future, we see that there would be a huge demand for these agencies. This is a real profitable business".
"The agencies are just concerned with money and do not care about AD, or any EoCIs etc. (According) *to them* (The agencies)*, they are giving a service to a problem an academic has. Initially they will have a discussion, and if you* (The academics) *are happy with the discussion, pay the advance, when it is done, pay the rest of the money for delivery. Here is no feeling or thought of academic honesty or dishonesty"*

The respondents were aware of the big picture in terms of the consequences fake research or selling research, but then they said that the agencies choose to ignore them for monitory reasons.

"The unfortunate fact is that we (The agencies) *get all the knowledge and experience from doing research whereas, the academics get only a piece of paper as a PhD certificate or a research paper in their name. We are the ones who are increasing our intellectual capability and not them. This is not how it should be, but this is how it is. Ough, I forgot to mention that we get paid for it too".*

They were clear that the agencies exist for a business purpose and not for an altruistic purpose or for a service to the society. They stated that it is the system that has created a demand for them.

"Researcher: This is a very sensitive question. Do you think what the agencies do is good? If so or if not – why do you think so?"
"Respondent1: You are asking if we are cheating. Well, in a way everyone is. Such agencies did not emerge out of nowhere. They have come up because of the system that the current academic system operates in".
"Respondent 2: We see this as something that we enjoy doing and that we get money for it, so a double bonus. Whereas the academics are unable to do it and so come to us. It is in a moral grey area, yes but we need to survive as well".

They also stated that the seeds for the need for the centers were sown when freshly graduated students were recruited to lecture the Under Graduates. The management does this to cut corners and save remuneration costs for the lecturers. So, when these lecturers and the students under them are asked to do research, they go to these agencies. These lecturers, their colleagues and their students are the customer base for the agencies.

The stagnation in the Indian market for engineering graduates was cited as a reason for people to start their own agency or to work for one of them. Also, the startup of a lot of new engineering institutions and the increase in the number of engineering seats available was cited to be a reason for the saturation of job market in engineering. 'Making a living' was stated as one of the major points for the increase of these agencies.

"It is difficult for people to get jobs these days, those who end up with a job while studying are ok, but the others have no job. Even if we (Agency employees) *go to a college and ask for job, well we technically cannot as we don't have a P.G., also the pay is very low there. But being in an agency, I learn, I do, I get paid more and I enjoy the challenge. It is not that*

everyone likes this job, but I do. It is just that I am not working at R&D of a company, but here I do my own R&D in a way".

In terms of their perception of the academics, the respondents stated that there are different levels at which the academics come to seek their service, from just doing a small part of the research to asking them to do the complete project/paper without the academic getting involved.

"Usually they (Academics) come to us with a vague idea and then we channel their ideas to a possible research topic".

They had high opinion of the academics who come to them because that academic's institution might not have a specific software or that they might not be exposed/experienced in computer programming. Whereas, they had low opinion of those who ask them to do it all.

"A Few of them (academics) *come and say that they have a clear idea, they have all the mathematical derivations and the design etc. They just ask us to do some coding, or write a programme for that equation they have on a sheet of paper to see if it really works. When we make some mistakes, they correct us. I do not think there is any dishonesty in that, as they just come to us for a small part of their work. But very few are like this, whereas most them ask us to do it all or a large chunk of it"*

Their opinion of the academics who approach them with no ideas were not so high.

"The academics who do research with us, or those who ask us to write research papers for them even after they (have) *publish* (ed) *or get* (got) *their doctorates will not have developed their knowledge, or their research capacity or capability. They will still be weak in research even after they publish. Before coming to us, they will be weak Mr. or Ms. X, after finishing with us, they might be Dr. X, but still with little knowledge gain".*

"Most of academics who approach us just know the area that they want us to do research, like I want to do a PhD in thermodynamics, or in robotics etc. They have very weak mathematical and programming skills. They will ask us to do the whole thing: Derive the equation, programme it, create a model and test it. They are basically buying what we are doing. They do research just for higher pay".

They further added that the academics have no idea if the data, results, experiment, writing up that the agencies give them are correct or not.

"Even if we do (make) *any mistake in the thesis, they* (Academics) *do not have the skills to know about it. I remember an incident, in which a wrong chip was used for the experiment and the results that came out were simulated and incorrect data was created based on it. They accepted it, and no one said anything."*

The respondents also stated that the academics split their research into different parts and ask their Masters and Batchelors students to do them, thus essentially reducing their own work load. The academics point the students to the agency where their project is being done. The students pay from their pocket to the agency, but ultimately it is the academic who is benefing from this.

"I myself have done two masters projects based on the same PhD recently. We will buy the equipment required for the academics' thesis from the money paid by their students to us. In such cases it is the students who are paying for the academics' research".

It was interesting to see that a few times the agency gets cheated by the academics who do not pay them the money after the project is delivered.

"We get cheated out as well. We give them (Academics) *a project, they present it in their institution. The project might have got approved, but they will call you (The agency) and say that his supervisor has rejected it (The project) as incorrect and that he does not want to do his project anymore with you. The truth is - they don't want to give you the money. This has made the centers very cold hearted and that they will not let you* (The academics) *take the project from the center until the final payment is all done".*

"There are times when they (Academics) don't pay us after the project is delivered! They are cheating those who help them in a way to cheat. We have all the proofs, mails etc. that it was us who did the project and not them. There was a case recently, in which XX agency did a project for a person who after having got it delivered, did not pay the outstanding amount of Rs. 40,000. They were not reachable on the phone and after a couple of weeks, even changed their phone no. So, the agency wrote a letter to them addressed to their college address saying that they have all the evidence that it was the agency who did the project and if the academic did not pay the remaining money, all the proof will be sent to the institution's head. They paid within a day. It is a pity that we must behave like a debt collecting agency".

Overall, this shows the perception that the agencies have towards themselves and towards the academics who approach them.

4. How the agencies see AD, EoCI and the links between them both?

It was clear from the responses of the agencies who believed that only a few of the academics considered EoCI to be important for conducting research, and it was mostly the lure of an incentive or higher pay that makes them to do research. They also admitted that there are a few academics who want to be ethical and to them perhaps EoCI would be important. From the agencies' responses, it was clear that except in considering that AD and EoCI are opposites, the agencies did not have any thought of the link between the both.

"I know a few of them as well, who want to do it all on their own, wait for the journals to accept it, modify it on their own etc. even if it takes a while. Though rare, they do exist".

"There would be a very few academics in each of the institution for whom EoCIs would be important".

The respondents spoke in detail about the AD at three different levels. i.e. Staff, institutional / management and governing bodies. The AD at the staff level has already been discussed in detail in the above sections of this chapter (Interviews with the academics and managers), to avoid repetition of same points, this section will look at the AD from the management and the governing bodies level.

Overall, it was seen that the AD is something that has become more prominent in the academic system, with all the stake holders right from the policy makers to the lecturers being a part of it one way or the other.

Summarising the points:

- Everything in the country has become commercial, people want to get things done quickly and in shortcuts. Academia and research environments are no exception to this.

- The academics find it easy to pay for the research rather than taking the effort to conduct it on their own along with all the teaching and administrative work that they must do.

"For writing of the thesis, the usual cost is Rs. 1,00,000 to 1,50,000. For publishing (Both writing and publishing) *in a low quality* (for example: Annexure 2 of Anna University) *journal, it costs Rs. 30,000 to 35,000, whereas for an annexure 1 (High quality) journal – it costs Rs. 60,000 to 80,000. A few agencies even quote Rs. 1,00,000. For this cost, the agencies will do everything".*

- The management and the governing bodies even if they are aware of it, usually turn a blind eye to it. Sometimes, it is the research supervisor who recommends the agencies.

"The management does know about all these (AD). The head of the research will be 'Taken care of' (Bribed) *too. The University Grants Commission (UGC), All India Council for Technical Education (AICTE) etc. also know about it, but they turn a blind eye to it. Well, they cannot check everyone".*

- The management's excessive dependence on numbers and quantity without due consideration to the quality of the output or the process by which the output was produced was cited four times during the interview as one of the major issues.

"Management is just concerned about numbers, number of papers, not the quality".

- The management employs U.G. graduates to teach, whereas the Governing bodies require at least a masters holder for a lecturing position.
- Having a higher Student to staff ratio than what the Governing bodies state.
- The management 'Rents' the certificates, or masters graduates during the period of inspection.

"Having U.G. (Batchelors) *graduates lecture Batchelors students are against the rules of the governing bodies, but that is how it is in a lot of institutions. When there is an inspection, the institutions contact people who have finished* (their) *masters and* rent *their certificates for the days of inspection alone. The governing bodies never go to the class or staff rooms to check if such staff really exists or not, but on paperwork they will have all P.G. staff members teaching in the college. The rental is around Rs. 5,000 / day. This is risky, because if the governing bodies find out, then the P.G. certificate might be made invalid and the institution be fined. It is very rare that they are caught".*

"The person who rented out his certificate will have a proper timetable in his name for those days of inspection, even though he might never even set foot in that campus. I think that even the inspectors know it".

- The governing bodies are not inspecting properly during the inspection or they are getting 'Taken care of' (Not sure how, or how much!) was cited.

"*The inspectors will be 'Taken care of' and they are usually lenient. Very rarely they raise any major issues"*

"The inspections are just eye-wash, a charade in which both parties know what the reality is, but have paperwork to prove otherwise".

Overall, it was is evident from the interviews (In the section below) that the agencies were aware of the various forms of AD happening at the institutions and that that it is difficult for an academic to be influenced by EoCI, whilst working in an environment that is prone to AD. When asked about the influence of AD on the academics' RP, it was believed that the quantity of research might have increased but the quality and the usefulness of the research has gone down. A lot of 'Junk papers' are produced which does not add to any scientific progress.

Researcher: "How does AD affect the RP of the academics?"
Respondent: "What research?"
"The papers pushed in a hurry through low quality journals are just useless with no one referencing (Citing) *them and it would just be another junk paper."*

One point that was raised by the agents that had previously been stated during the academic interviews is that most of the academics start with good intentions but then evolve to be dishonest.

"They (Academics) start with good thoughts. But compared to them, their colleagues who approach an agency publish quicker and more. This creates a sense of insecurity in the academic who is doing it properly. So, he asks the guy which agency he went to".

5. How to reduce AD?

The agents were stating that the system itself needs changing which is going to take a lot of effort. On a smaller scale, some of the suggestions from the respondents include:

"They should do research for the right reasons, not just for the monetary benefits".
"If the salary of a PhD holder was not three times higher than that of a P.G. (Masters / post graduate) *holder, then having to do fake research for promotion might not be that tempting for them".*
"(The) research Dean of the institution should be an ethical person and be efficient in finding out malpractices".
"The management should set an example for the other staff members to follow. P.G. students who do their dissertation with us when they go to teach, would not be able to teach the students properly".
"The staff should not teach just to finish the syllabus, but to make sure that the students understand the subject and its applications, which they never do".
"The management should treat the staff members good, as in some of the institutions the academics are treated very poorly".

The above points tie in with the interviews from the managers and the academics. There has been an increase in number of colleges and number of student seats (Supply) which has become greater than the demand. Due to this, the newly started and yet to be reputed institutions (Less well-established institutions) have had to cut costs, but still want to maximise their ranking. They do this by asking their staff to publish more. It is not going to happen! This was cited by the respondents as one of the major reasons cited by the respondents for an increase in AD. They (respondents across the spectrum interviewed) also suggested that the management should abandon short term goals and objectives. They should focus on long term investment and building of skills, infrastructure in terms of research.

Conclusion:

The interviews with the agencies has shed light on various things such as the different types of AD, how the agencies work and conduct research, how they collect data, analyse and their links with the publishers. The interviews also show their perception of AD, EoCI and include a few suggestions from them on how to reduce AD.

Appendix.4: Figures (not included in main body of text):

Fig.42: Histogram of the ORP score before outlier analysis:

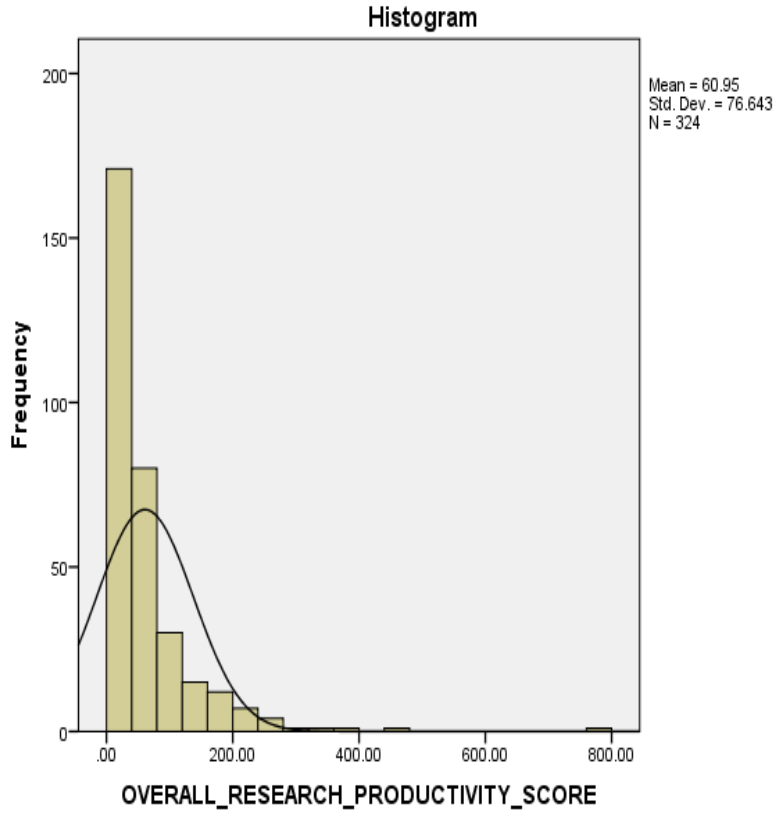

Fig.43: Q-Q plot of the ORP score before outlier analysis

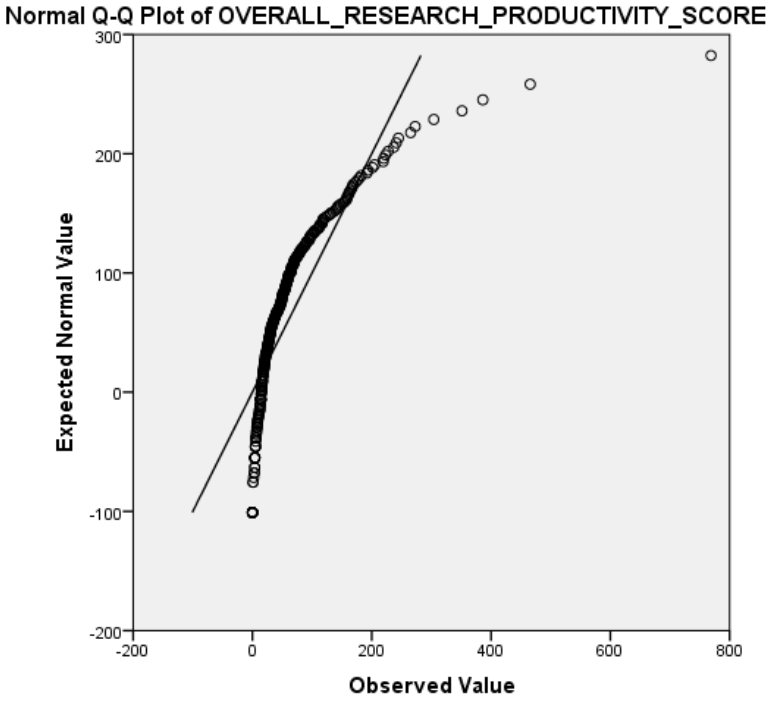

Fig.44: Stem and leaf diagram after outlier analysis

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OVERALL_RESEARCH_PRODUCTIVITY_SCORE Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

    45.00        0 .  000000000011233334444445555556666677777888999
    52.00        1 .  00122222223444444444455555555666667777777778899999999
    38.00        2 .  00011111112222444444555566677777888899
    30.00        3 .  000000111122233445556677888999
    22.00        4 .  0023334455677778999999
    24.00        5 .  00011333445555667778999 9
    16.00        6 .  0001344455667899
    13.00        7 .  0000334568899
     7.00        8 .  1225778
    10.00        9 .  0015566799
     4.00       10 .  3347
     9.00       11 .  122367789
     2.00       12 .  26
     4.00       13 .  0159
     4.00       14 .  1247
    27.00 Extremes    (>=153)

Stem width:     10.00
Each leaf:       1 case(s)
```

Fig.45: Histogram of the ORP score after outlier analysis

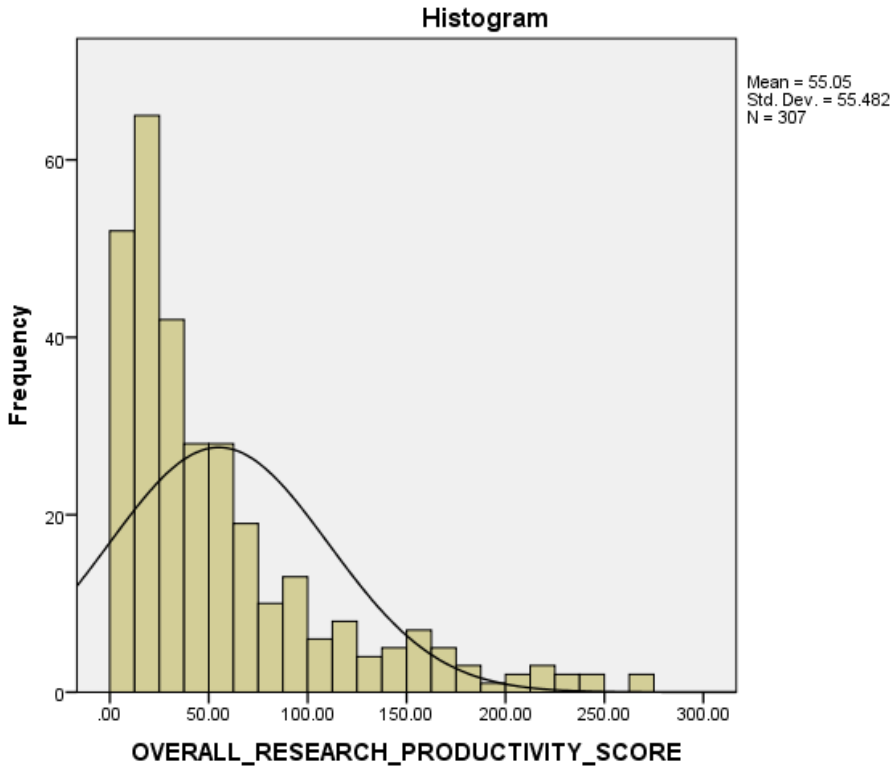


Fig.46: Q-Q plot of the ORP score after outlier analysis

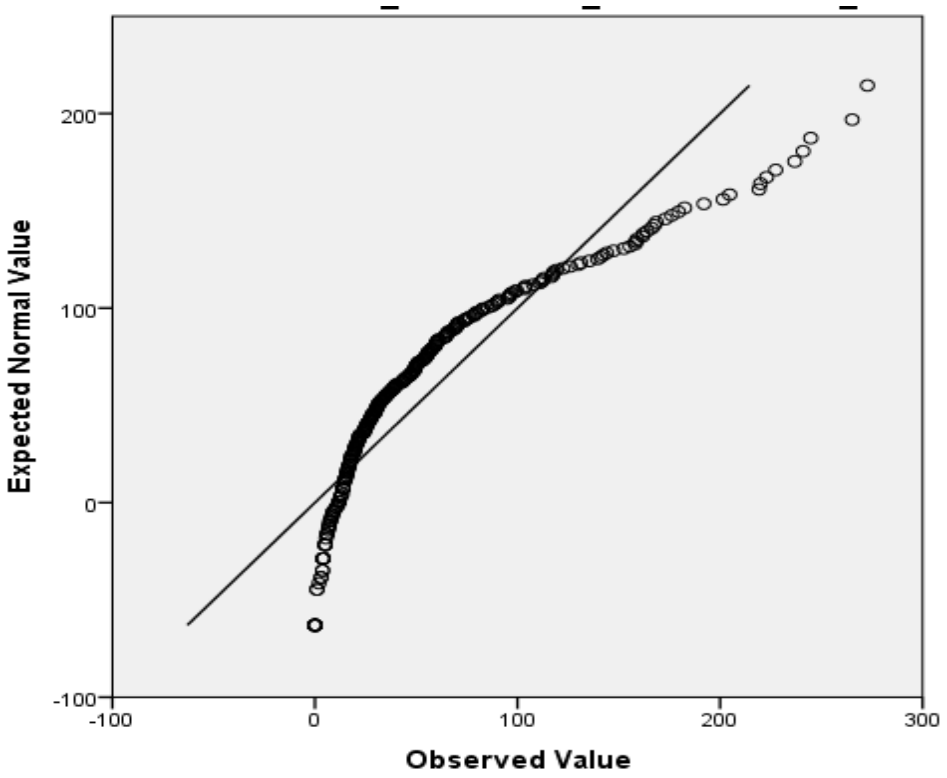


Fig.47 Distribution based on gender:

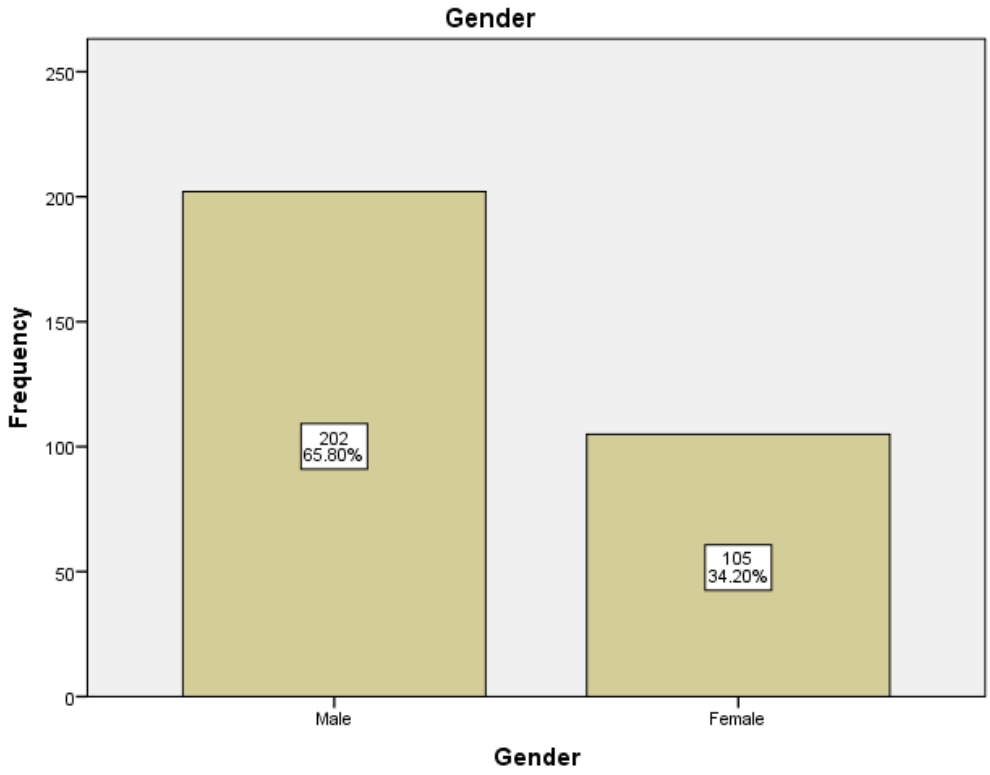


Fig.48: Mean rank for the M-W-U test for ORP and

No table of figures entries found. Marital status:

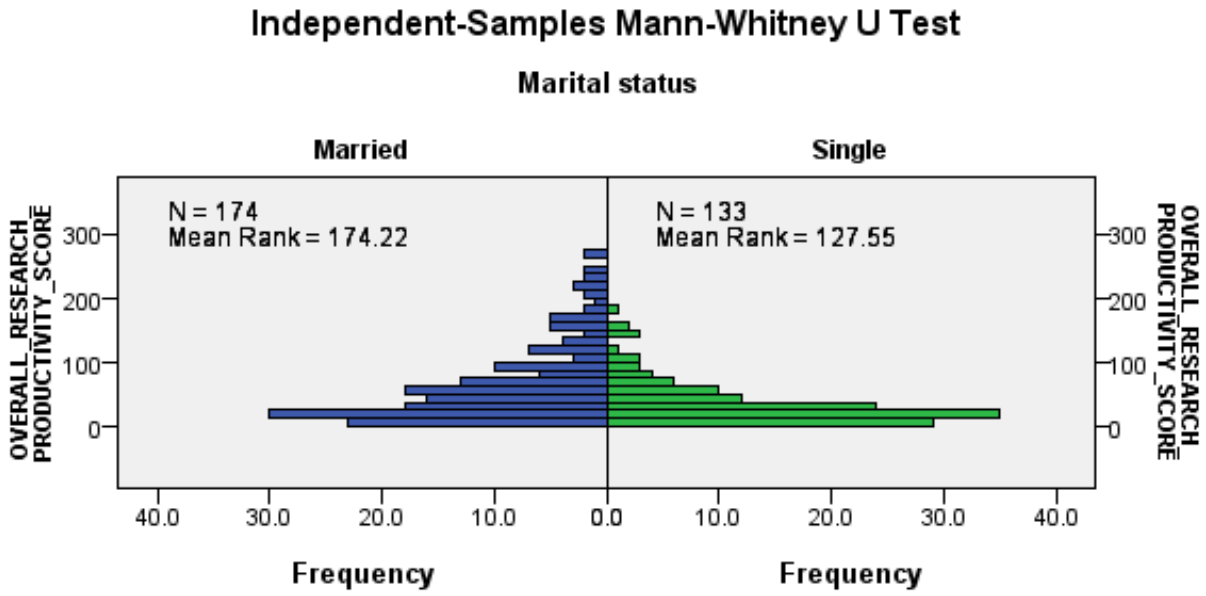
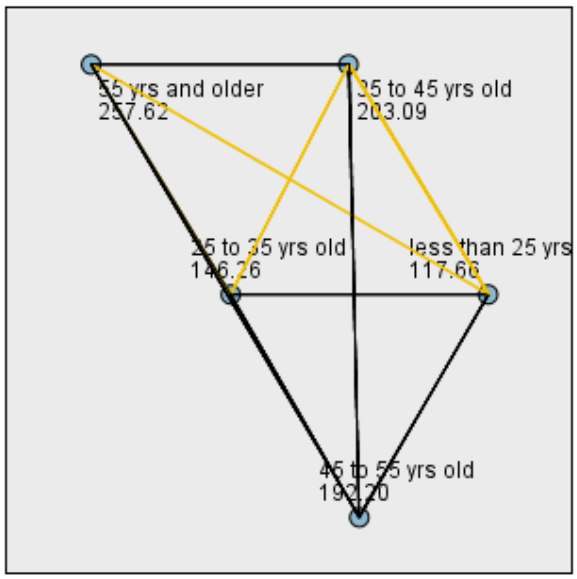


Fig.49: Pairwise comparison of the ORP of different age groups:

Pairwise Comparisons of Age group in years



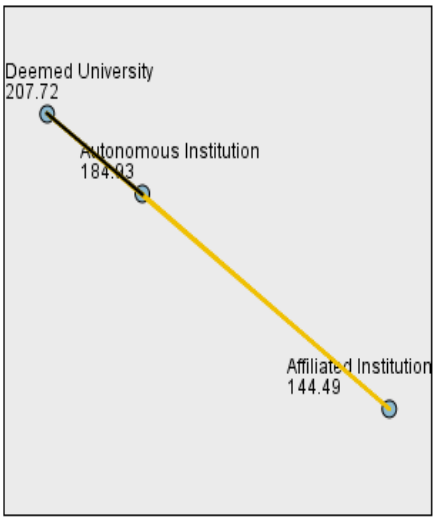
Each node shows the sample average rank of Age group in years.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
less than 25 yrs-25 to 35 yrs old	-28.597	16.377	-1.746	.081	.808
less than 25 yrs-45 to 55 yrs old	-74.538	31.932	-2.334	.020	.196
less than 25 yrs-35 to 45 yrs old	-85.431	20.371	-4.194	.000	.000
less than 25 yrs-55 yrs and older	-139.963	46.920	-2.983	.003	.029
25 to 35 yrs old-45 to 55 yrs old	-45.941	28.712	-1.600	.110	1.000
25 to 35 yrs old-35 to 45 yrs old	-56.834	14.823	-3.834	.000	.001
25 to 35 yrs old-55 yrs and older	-111.366	44.791	-2.486	.013	.129
45 to 55 yrs old-35 to 45 yrs old	10.893	31.163	.350	.727	1.000
45 to 55 yrs old-55 yrs and older	-65.425	52.513	-1.246	.213	1.000
35 to 45 yrs old-55 yrs and older	-54.532	46.400	-1.175	.240	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.50: Pairwise comparison of the type of institutions and their ORP

Pairwise Comparisons of Type of the institution



Each node shows the sample average rank of Type of the institution.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Affiliated Institution-Deemed University	-63.230	16.959	-3.728	.000	.001
Affiliated Institution-Autonomous Institution	-40.434	11.982	-3.374	.001	.002
Autonomous Institution-Deemed University	-22.796	18.532	-1.230	.219	.656

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.51: Percentage of time spent for research in the various institutions:

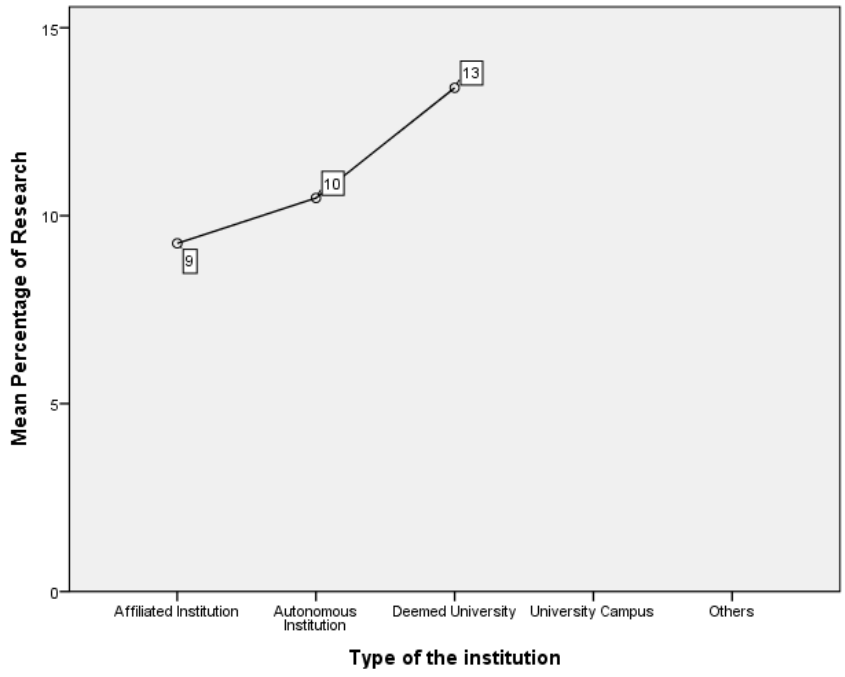
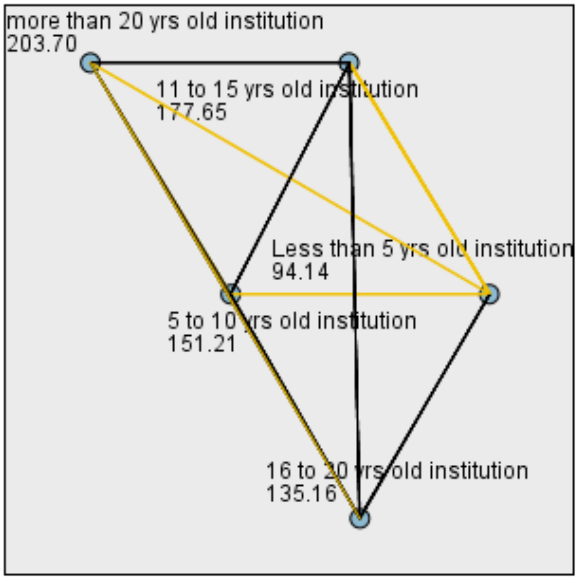


Fig.52: Pairwise comparison of the age of the institutions and their ORP

Pairwise Comparisons of Age of the institution



Each node shows the sample average rank of Age of the institution.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Less than 5 yrs old institution-16 to 20 yrs old institution	-41.024	19.480	-2.106	.035	.352
Less than 5 yrs old institution-5 to 10 yrs old institution	-57.074	17.675	-3.229	.001	.012
Less than 5 yrs old institution-11 to 15 yrs old institution	-83.518	18.236	-4.580	.000	.000
Less than 5 yrs old institution-more than 20 yrs old institution	-109.567	23.034	-4.757	.000	.000
16 to 20 yrs old institution-5 to 10 yrs old institution	16.050	14.640	1.096	.273	1.000
16 to 20 yrs old institution-11 to 15 yrs old institution	42.494	15.313	2.775	.006	.055
16 to 20 yrs old institution-more than 20 yrs old institution	-68.543	20.797	-3.296	.001	.010
5 to 10 yrs old institution-11 to 15 yrs old institution	-26.444	12.940	-2.044	.041	.410
5 to 10 yrs old institution-more than 20 yrs old institution	-52.493	19.117	-2.746	.006	.060
11 to 15 yrs old institution-more than 20 yrs old institution	-26.049	19.637	-1.327	.185	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.53: Percentage of time spent for research and the age of the institutions:

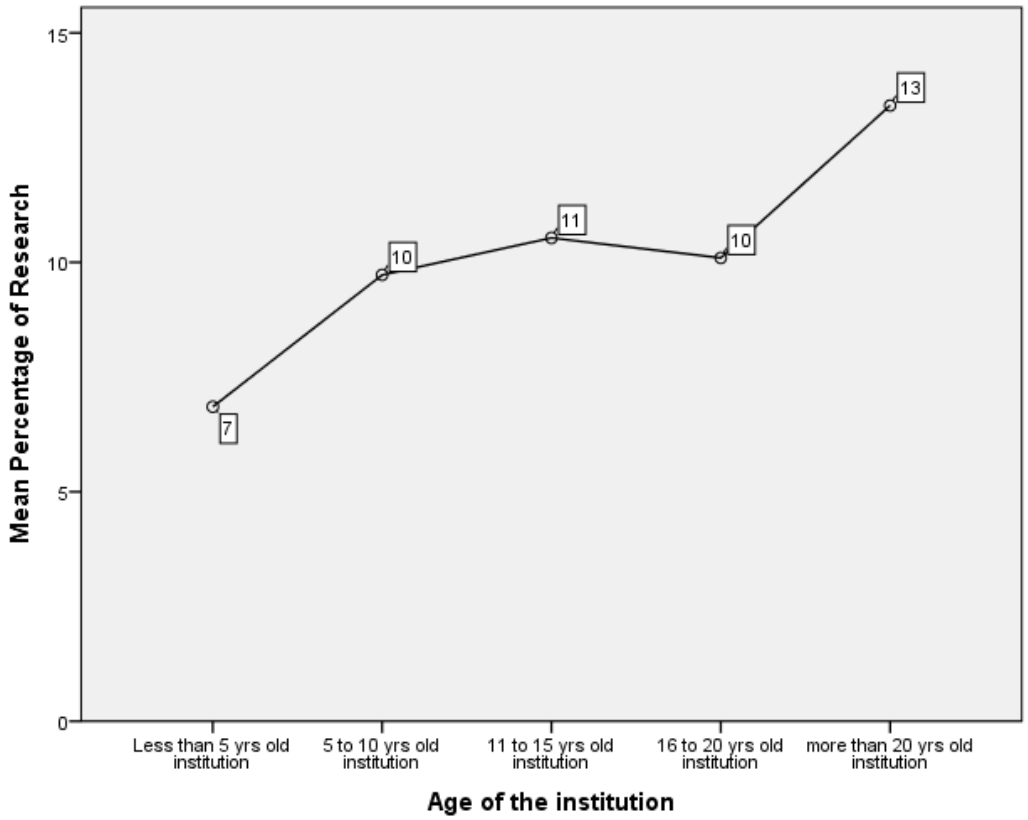
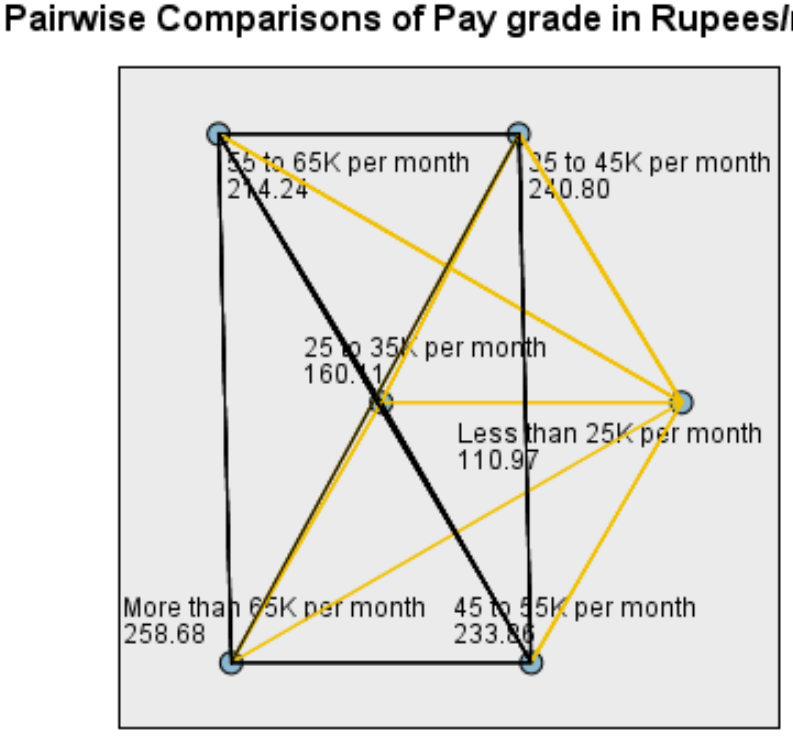


Fig.54: Pairwise comparison based on the academics' pay and their ORP

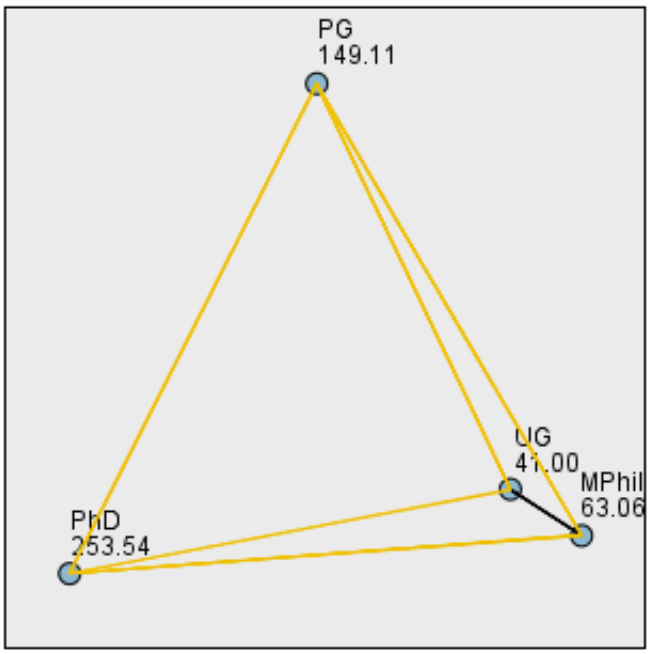


Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Less than 25K per month-25 to 35K per month	-49.141	11.882	-4.136	.000	.001
Less than 25K per month-55 to 65K per month	-103.268	20.979	-4.922	.000	.000
Less than 25K per month-45 to 55K per month	-122.893	29.044	-4.231	.000	.000
Less than 25K per month-35 to 45K per month	-129.825	19.630	-6.614	.000	.000
Less than 25K per month-More than 65K per month	-147.705	23.888	-6.183	.000	.000
25 to 35K per month-55 to 65K per month	-54.127	20.993	-2.578	.010	.149
25 to 35K per month-45 to 55K per month	-73.751	29.054	-2.538	.011	.167
25 to 35K per month-35 to 45K per month	-80.684	19.645	-4.107	.000	.001
25 to 35K per month-More than 65K per month	-98.564	23.900	-4.124	.000	.001
55 to 65K per month-45 to 55K per month	19.625	33.809	.580	.562	1.000
55 to 65K per month-35 to 45K per month	26.557	26.170	1.015	.310	1.000
55 to 65K per month-More than 65K per month	-44.437	29.499	-1.506	.132	1.000
45 to 55K per month-35 to 45K per month	6.933	32.989	.210	.834	1.000
45 to 55K per month-More than 65K per month	-24.813	35.688	-.695	.487	1.000
35 to 45K per month-More than 65K per month	-17.880	28.555	-.626	.531	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.55: Pairwise comparison based on the degrees achieved and their ORP

Pairwise Comparisons of Degrees achieved



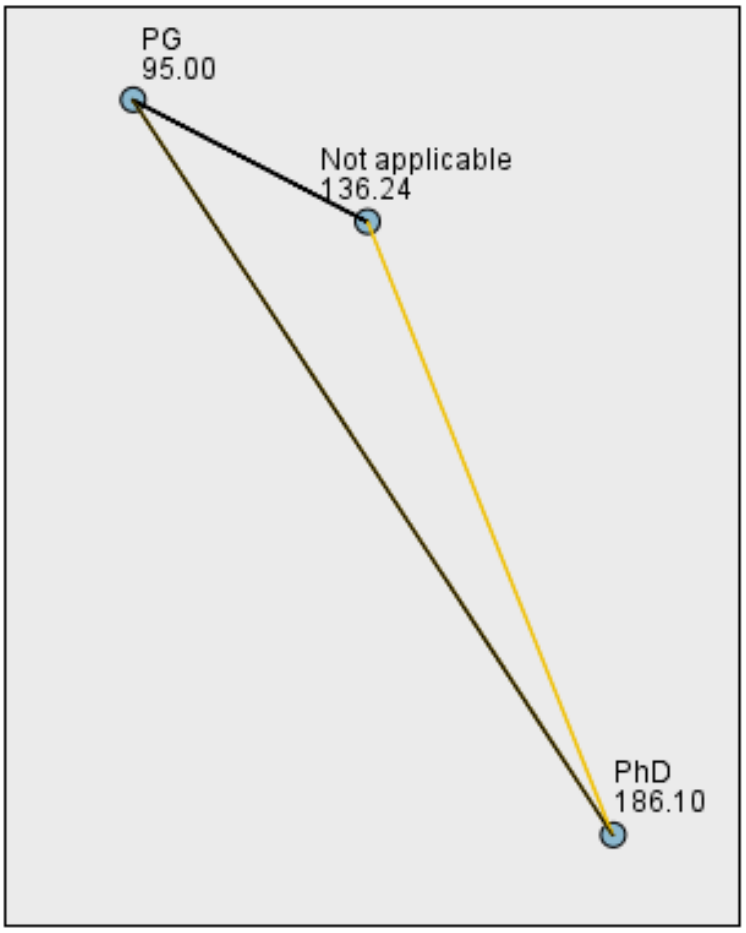
Each node shows the sample average rank of Degrees achieved.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
UG-MPhil	-22.056	46.782	-.471	.637	1.000
UG-PG	-108.112	36.647	-2.950	.003	.019
UG-PhD	-212.536	39.932	-5.322	.000	.000
MPhil-PG	86.056	30.088	2.860	.004	.025
MPhil-PhD	-190.480	34.012	-5.600	.000	.000
PG-PhD	-104.424	17.642	-5.919	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.56: Pairwise comparison based on the degrees working towards and their ORP

Pairwise Comparisons of Degree working towards



Each node shows the sample average rank of Degree working towards.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
PG-Not applicable	41.242	63.088	.654	.513	1.000
PG-PhD	-91.099	63.328	-1.439	.150	.451
Not applicable-PhD	-49.857	10.564	-4.720	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Fig.57: Frequency of the EoRP truncated at ten:

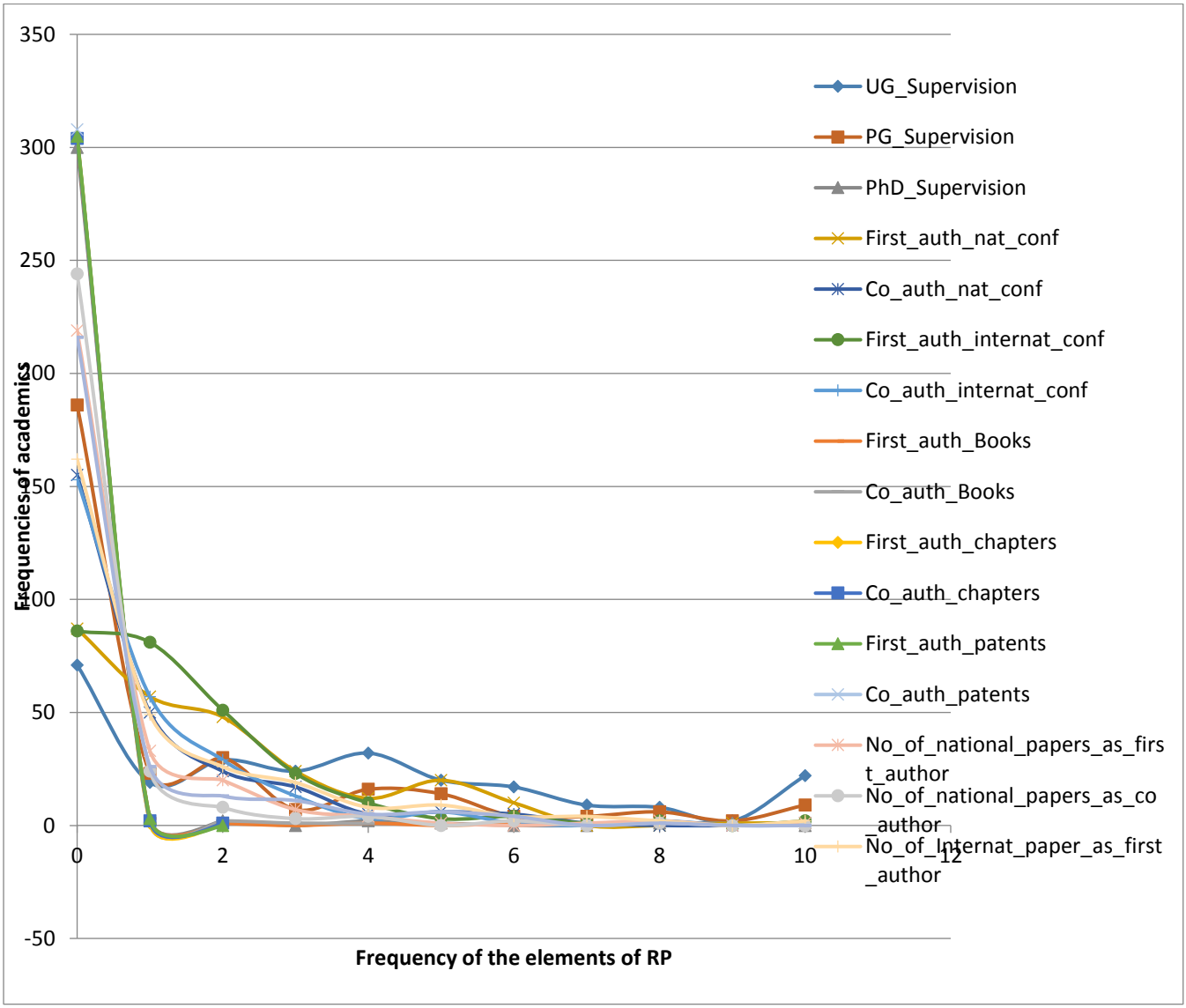


Fig.58: Frequency of the EoRP truncated at five:

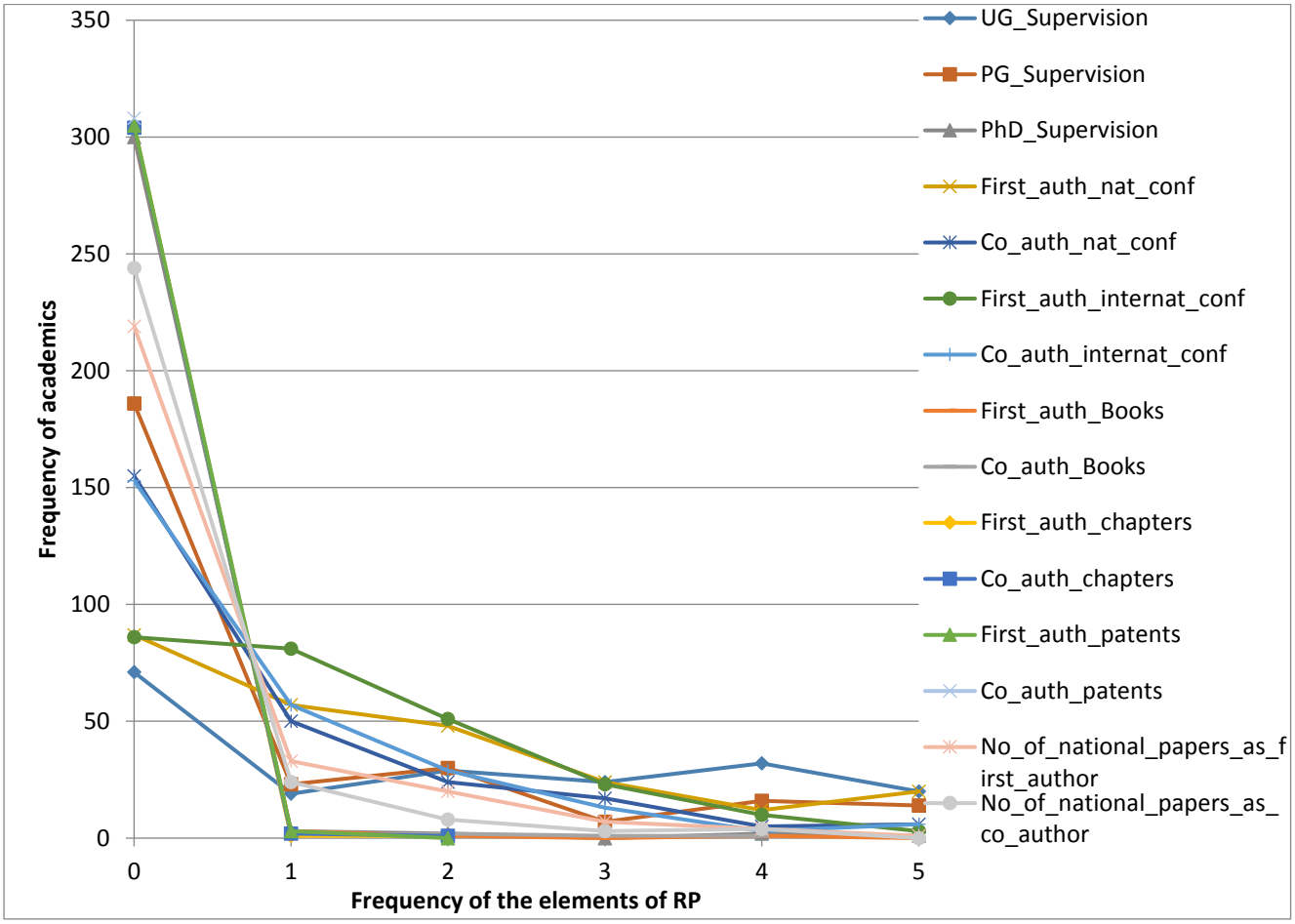


Fig.59: Interaction of Gender and Teaching experience years on the ORP:

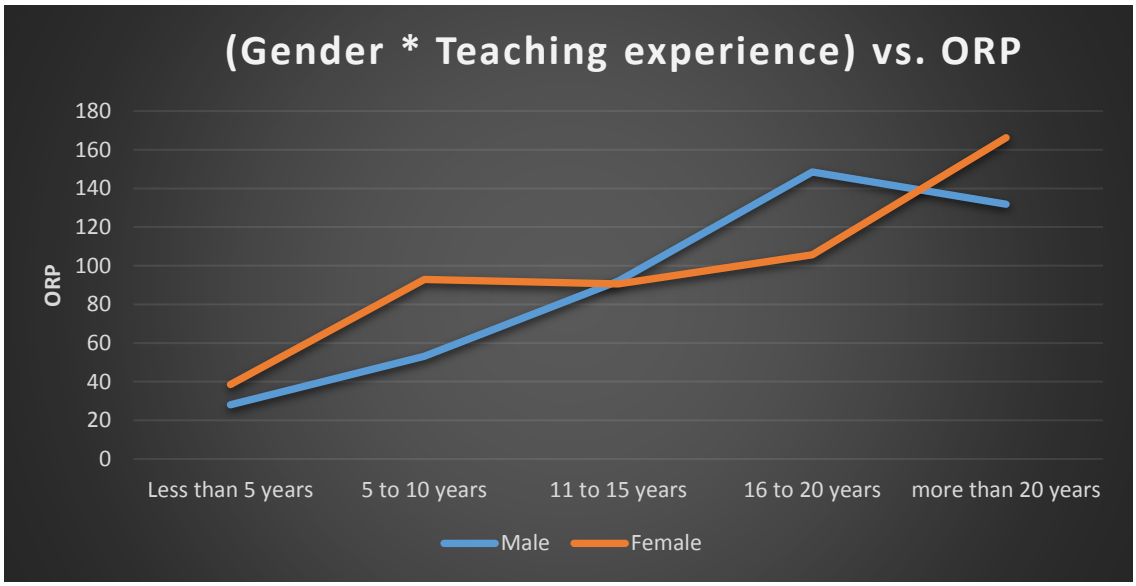


Fig.60: Interaction of Age group and marital status on the ORP:

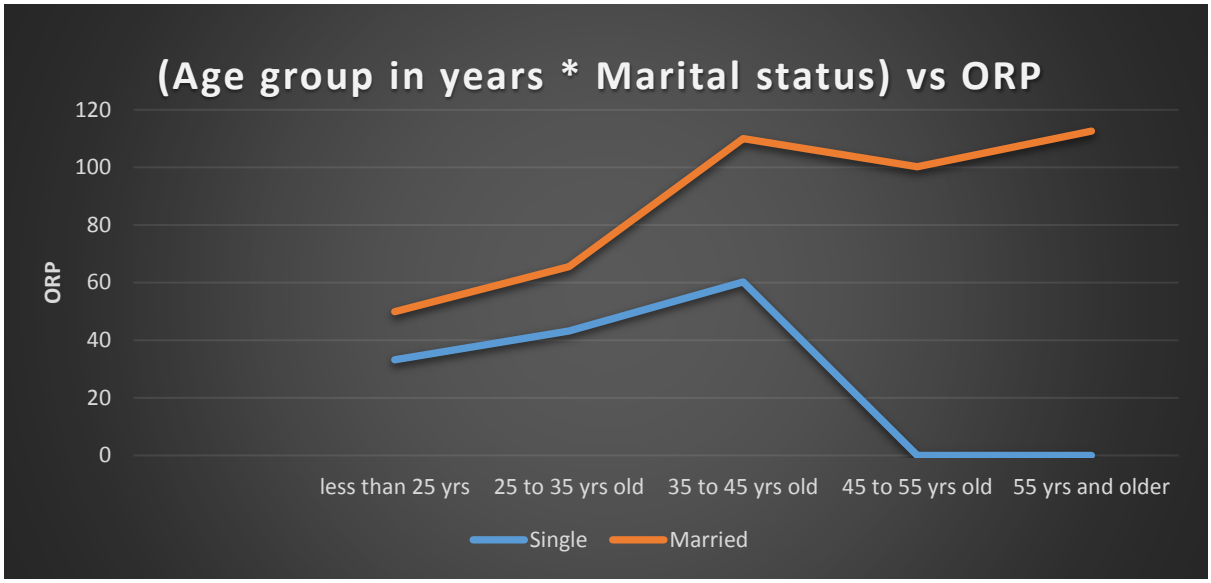


Fig.61: Interaction of Gender, marital status and teaching experience on the ORP:

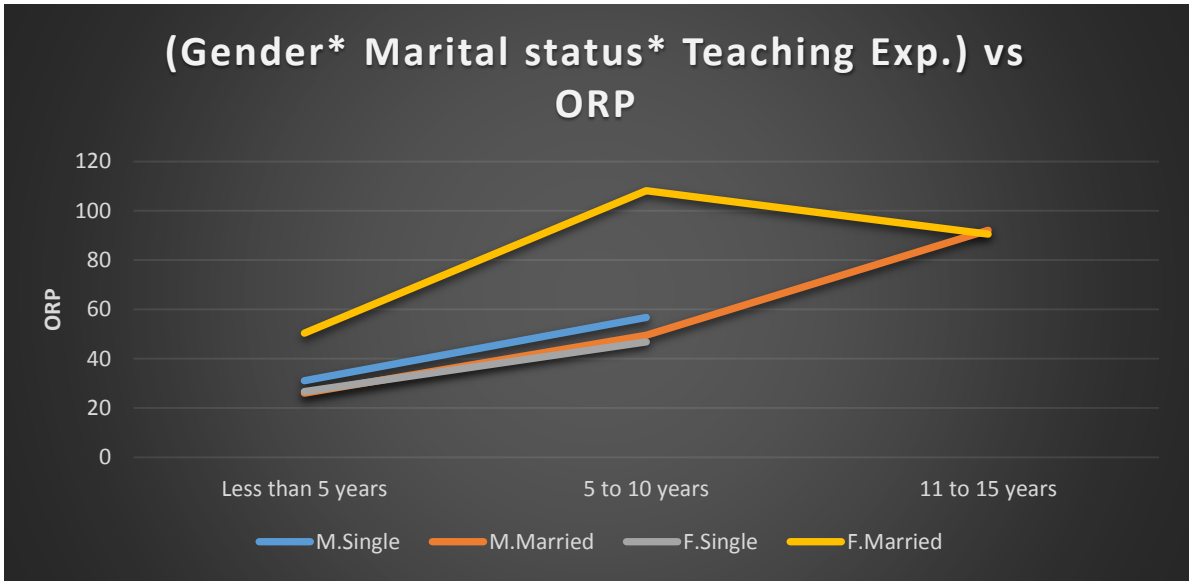


Fig.62: Interaction of Age group and gender on the median ORP:

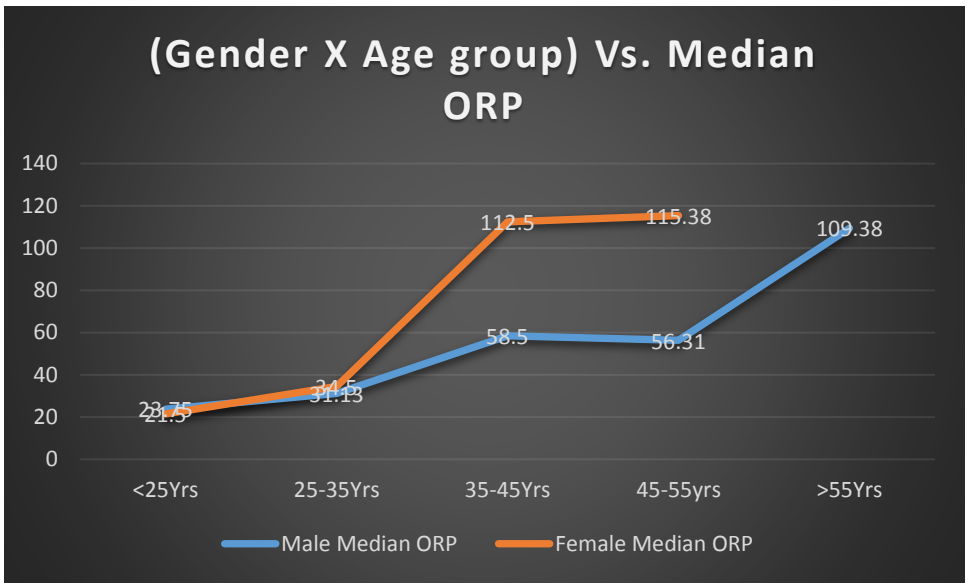


Fig.63: Interaction of Age group and gender on the mean ORP:

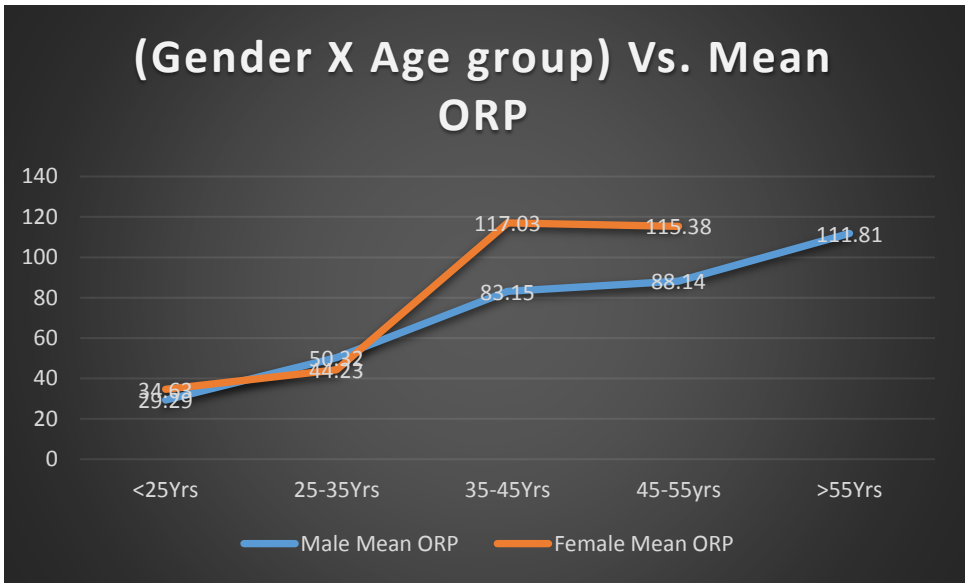
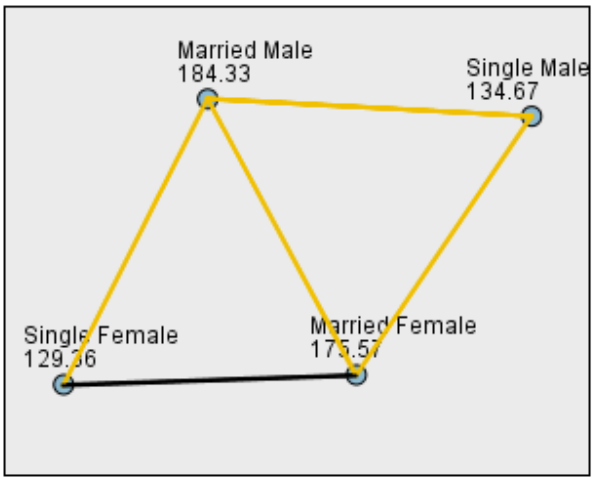


Fig. 64: Pairwise comparison of the interaction between gender and Marital status with ORP:

Pairwise Comparisons of Gender_Marital

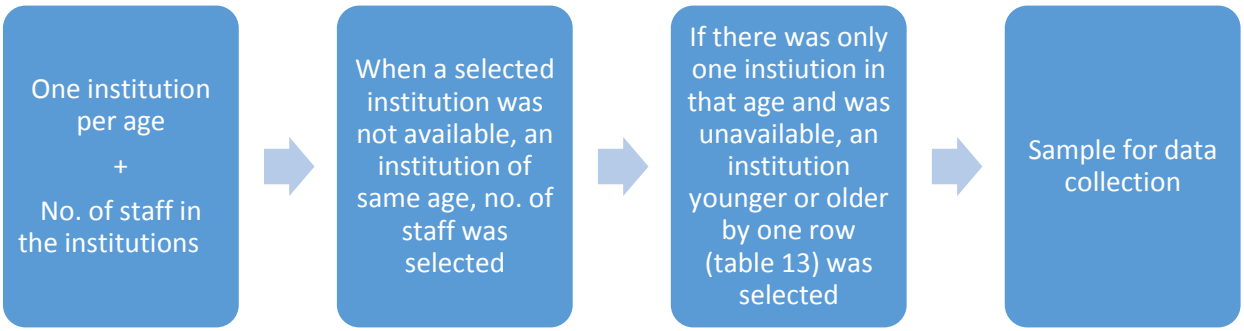


Each node shows the sample average rank of Gender_Marital.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Single Female-Single Male	5.305	17.677	.300	.764	1.000
Single Female-Married Female	-46.207	18.746	-2.465	.014	.082
Single Female-Married Male	54.970	17.548	3.133	.002	.010
Single Male-Married Female	-40.902	14.286	-2.863	.004	.025
Single Male-Married Male	-49.665	12.673	-3.919	.000	.001
Married Female-Married Male	8.763	14.126	.620	.535	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
Significance values have been adjusted by the Bonferroni correction for multiple tests.

Fig. 65: Sampling procedure adopted for selection of institutions:



Source: Author

Appendix 5: Tables (not included in main body of text):

Table 5: Demographics of the Engineering institutions in Coimbatore (As of 2014)

Name of the institution	Year starting	Age of institution	Status	No. of departments			No. of students seats available / year			No. of staff	No. of PhDs
				UG	PG	MBA/MCA	UG	PG	MBA/MCA		
Sri Ramakrishna Engineering College	1994	21	Affiliated (Aff.)	9	9	1	1020	168	0	246	17
Maharaja Engineering College	1994	21	Aff.	7	8	2	N/A	N/A	N/A	N/A	N/A
Park College of Engineering Technology	1997	18	Aff.	8	3	2	750	54	120	144	8
Sri Krishna College of Engg and Tech	1998	17	Aff.	7	7	2	1080	120	180	Combined*	
Hindusthan College of Engineering and Technology	2000	15	Aff.	10	5	2	1260	138	120	194	17
Coimbatore Institute of Engineering and Information Technology	2001	14	Aff.	7	7	1	840	150	120	225	20
Maharaja Prithvi Engineering College	2002	13	Aff.	6	0	0	660	108	0	N/A	N/A
Sri Ramakrishna Institute of Technology	2002	13	Aff.	6	4	2	600	72	120	146	23
Nehru Institute of Engineering and Technology	2006	9	Aff.	6	3	2	600	78	120	118	6
Sri Shakthi Institute of Engineering	2006	9	Aff.	7	8	1	780	174	60	135	18

and Technology											
R.V.S. College of Engineering and Technology	2007	8	Aff.	5	5	0	360	114	0	121	7
Dr. N.G.P. Institute of Technology	2007	8	Aff.	7	4	2	540	72	180	182	31
Hindustan Institute of Technology	2007	8	Aff.	6	2	2	420	48	120	86	6
Info Institute of Engineering	2007	8	Aff.	6	4	2	660	84	180	N/A	N/A
Karpagam Institute of Technology	2007	8	Aff.	6	0	2	540	180	0	N/A	N/A
R.V.S. Faculty of Engg/ college of engg & tech	2007	8	Aff.	5	5	0	360	86	0	124	7
Ranganathan Engineering College	2007	8	Aff.	6	4	1	540	90	0	N/A	N/A
S.N.S. College of Engineering	2007	8	Aff.	6	6	2	720	108	180	226	20
Sasurie Academy of Engineering	2007	8	Aff.	5	4	1	480	108	60	136	4
Adithya Institute of Technology	2008	7	Aff.	6	5	1	660	54	60	122	10
EASA College of Engineering and Technology	2008	7	Aff.	7	7	1	540	126	60	N/A	N/A
Indus College of Engineering	2008	7	Aff.	6	1	1	420	18	60	N/A	N/A
Nehru Institute of Technology	2008	7	Aff.	7	3	1	570	54	60	150	6
K.G.I.S.L. Institute of Technology	2008	7	Aff.	5	2	0	480	36	0	N/A	N/A
K.T.V.R. Knowledge Park for Engineering and Technology	2008	7	Aff.	5	0	0	420	0	0	N/A	N/A
Kalaignar Karunanidhi Institute of Technology	2008	7	Aff.	6	5	2	540	90	120	N/A	N/A
Kathir College of Engineering	2008	7	Aff.	7	4	1	540	96	120	N/A	N/A
P.A. College of Engineering and Technology	2008	7	Aff.	5	3	0	540	84	0	162	14

P.P.G. Institute of Technology	2008	7	Aff.	7	4	2	660	84	0	103	10
Sri Eshwar College of Engineering	2008	7	Aff.	5	5	0	600	114	0	110	7
Tejaa Shakthi Institute of Technology for Women	2008	7	Aff.	4	2	0	360	36	0	51	1
Akshaya College of Engineering & Technology	2009	6	Aff.	6	5	0	600	102	0	138	2
C.M.S. College of Engineering and Technology	2009	6	Aff.	5	2	0	420	48	0	54	1
J.C.T. College of Engineering and Technology	2009	6	Aff.	9	4	0	660	72	0	N/A	N/A
Jansons Institute of Engineering and Technology	2009	6	Aff.	5	3	0	540	54	0	93	8
K.P.R. Institute of Engineering and Technology	2009	6	Aff.	5	4	0	720	144	0	136	15
Kalaivani College of Technology	2009	6	Aff.	5	1	0	360	18	0	70	2
Park College of Technology	2009	6	Aff.	6	0	0	420	0	0	26	1
RVS technical campus	2009	6	Aff.	6	4	2	240	96	120	-(Already combined) *	
S.V.S. College of Engineering	2009	6	Aff.	7	4	0	660	72	0	138	9
Sriguru Institute of Technology	2009	6	Aff.	5	3	0	540	72	0	98	4
United Institute of Technology	2009	6	Aff.	5	2	0	504	33	0	128	8
A.S.L. Pauls College of Engineering and Technology, Pollachi Taluk	2010	5	Aff.	6	1	0	480	18	0	N/A	N/A
Christ The King Engineering College	2010	5	Aff.	5	0	0	480	0	0	48	0
Sree Sakthi Engineering College	2010	5	Aff.	5	1	0	480	18	0	86	5
Rathinam Technical Campus	2011	4	Aff.	5	2	0	360	32	0	38	4

Sri Ranganathar Institute of Engineering and Technology	2011	4	Aff.	5	0	0	300	0	0	46	7
Nightingale Institute of Technology	2012	3	Aff.	5	0	0	300	0	0	N/A	N/A
Pollachi Institute of Engineering and Technology	2012	3	Aff.	5	0	0	360	0	0	N/A	N/A
Suguna College of Engineering	2012	3	Aff.	5	0	0	300	0	0	30	0
V.S.B. College of Engineering Technical Campus	2012	3	Aff.	5	1	0	420	24	0	21	2
Arjun College of Technology	2013	2	Aff.	4	0	0	240	0	0	N/A	N/A
Asian College of Engineering and Technology	2013	2	Aff.	5	0	0	300	0	0	N/A	N/A
Dhaanish Ahmed Institute of Technology	2013	2	Aff.	5	0	0	300	0	0	12	0
Vishnu Lakshmi College of Engineering and Tech	2013	2	Aff.	5	2	0	420	48	0	N/A	N/A
PSG institute of tech and applied resarch	2014	1	Aff.	5	0	0	300	0	0	27	14

329	168	38	29,244	3,470	2,160		

Source: Author, based on (AICTE, 2018, AICTE, 2017a, Council, 2017, AnnaUniv, 2017, AnnaUniv, 2016) and all the institutions websites. Accessed between19/06/2014 to 26/09/2014 and 03/04/2017.

*Only combined data was available.

Table 65: Summary of the missing values:

Variable Summary[a,b]					
	Missing		Valid		Std.
	N	%	N	Mean	Dev.
Academic links	130	40.1%	194		
If I am conducting my PhD or research, I might have a better husband/wife	25	7.7%	299		
There are a some engineering colleges in Coimbatore which should not have been accredited at all	10	3.1%	314		
I consider 'Auspicious time', 'Astrology' and/or 'Vaastu Saastram' (Architectural codes) to be of importance while making decisions about the research.	9	2.8%	315		
My job is secure enough for me to focus on research	6	1.9%	318		
Percentage of other duties	6	1.9%	318	14.80	10.172
Percentage of Student monitoring	6	1.9%	318	15.58	8.480
Percentage of paper work	6	1.9%	318	11.67	9.787
Percentage of Research	6	1.9%	318	10.02	8.781
Percentage of teaching	6	1.9%	318	47.96	16.377
I am confident in my skills of using research tools and software	5	1.5%	319		
Curiosity is the driving force behind me conducting research	4	1.2%	320		
Delays in research process are inevitable and acceptable	3	0.9%	321		
There is a shortage in the number of guides / supervisors for conducting PhD and further research	3	0.9%	321		
The checks to counteract the malpractices in the colleges are largely ineffective	3	0.9%	321		
The colleges are becoming more and more into a money making machine	3	0.9%	321		
I prefer to teach rather than conduct research	3	0.9%	321		
Unfortunately it is becoming common that academics are buying research work rather to conducting it themselves	2	0.6%	322		
As long as I get my PhD, Promotion, or better opportunity; I don't really care if people use my research or not	2	0.6%	322		
There are too few industry-academia links	2	0.6%	322		
There is a lack of public expenditure on research	2	0.6%	322		
The quality of the students entering engineering colleges has dropped noticeably	2	0.6%	322		
The colleges in general lack vision for the lecturers' development and their research	2	0.6%	322		
My teaching workload prevents me from conducting research	2	0.6%	322		
I will not waste time conducting research – if it does not lead to promotion	2	0.6%	322		
a. Maximum number of variables shown: 25					
b. Minimum percentage of missing values for variable to be included: 0.1%					

Table 66: Correlation matrix of the demographic variables:

	Gender	Age group in years	Marital status	Type of the institution	Age of the institution	Position in the institution	Department	Teaching experience in years	Pay grade in Rupees/month	Industrial experience	Percentage of teaching	Percentage of Research	Percentage of paper work	Percentage of Student monitoring	Percentage of other duties	Degrees achieved	Degree working towards	Working hours per day	Teaching related hours per week	Residency from the
Gender	1																			
Age group in years	-.129**	1																		
Marital status	.131**	.434**	1																	
Type of the institution	-0.006	0.054	.120**	1																
Age of the institution	0.016	0.098	.179**	.538**	1															
Position in the institution	-0.039	.377**	.169**	-.140**	-0.097	1														
Department	0.095	0.019	.123**	-0.02	0.058	0.05	1													
Teaching experience in years	-0.027	.667**	.459**	0.061	.190**	.447**	0.075	1												
Pay grade in Rupees/month	-0.041	.471**	.318**	.471**	.367**	.447**	-0.005	.622**	1											
Industrial experience	.290**	-.273**	-0.086	-0.008	.142**	-0.103	.133**	-0.075	-0.097	1										

Percentage of teaching	-0.018	0.011	-0.057	-0.068	-0.003	-.157**	-.149**	-0.058	-.184**	-0.081	1								
Percentage of Research	-.126*	0.107	0.09	.122*	0.105	.130*	0.051	.177**	.258**	0.078	-.301**	1							
Percentage of paper work	-0.02	-0.075	0.017	0.072	0.014	0.015	0.033	-0.044	0.036	0.012	-.556**	0.019	1						
Percentage of Student monitoring	.146*	-0.02	-0.031	0.013	-0.06	0.066	.139*	-0.044	-0.01	0.028	-.439**	-.225**	-0.025	1					
Percentage of other duties	0.054	-0.031	0.025	-0.081	-0.063	0.062	0.05	0.014	0.043	0.041	-.461**	-.209**	-0.084	0.091	1				
Degrees achieved	0.032	.407**	.242**	-0.024	-0.028	.435**	.226**	.432**	.504**	0.029	-.151**	.230**	0.006	0.03	0.012	1			
Degree working towards	-0.062	0.089	.206**	.238**	.214**	-0.099	-0.02	.198**	.186**	-0.098	-0.076	.242**	0.038	-.130*	-0.003	-.172**	1		
Working hours per day	-0.085	0.034	0.05	.259**	-0.004	0.046	-0.089	0.068	.267**	-0.067	-.158**	0.108	-0.016	.155**	0.053	-0.024	.146*	1	
Teaching related hours per week	0.095	-0.021	-0.027	-.116*	-.224**	-0.109	-0.056	-.156**	-.214**	-0.041	0.079	-.205**	-0.048	0.04	0.052	-.154**	0.026	0.091	1
Residency from the campus	0.093	0.024	.160**	-.250**	-.130*	0.107	0.049	0.029	-.120*	-0.03	0.018	-0.043	-0.012	0.039	-0.016	.136*	-.113*	-0.089	.144*

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

c. Cannot be computed because at least one of the variables is constant.

Table 67: Non-parametric correlations between ORP and age of the institution:

Correlations				
			ORP	Age of the institution
Kendall's tau_b	ORP	Correlation Coefficient	1.000	.138**
		Sig. (2-tailed)	.	.001
		N	307	307
	Age of the institution	Correlation Coefficient	.138**	1.000
		Sig. (2-tailed)	.001	.
		N	307	307
Spearman's rho	ORP	Correlation Coefficient	1.000	.186**
		Sig. (2-tailed)	.	.001
		N	307	307
	Age of the institution	Correlation Coefficient	.186**	1.000
		Sig. (2-tailed)	.001	.
		N	307	307
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 68: Non- parametric correlations between ORP and years of experience:

Correlations				
			Teaching experience in years	ORP
Kendall's tau_b	Teaching experience in years	Correlation Coefficient	1.000	.394**
		Sig. (2-tailed)	.	.000
		N	307	307
	ORP	Correlation Coefficient	.394**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
Spearman's rho	Teaching experience in years	Correlation Coefficient	1.000	.496**
		Sig. (2-tailed)	.	.000
		N	307	307
	ORP	Correlation Coefficient	.496**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 69: Non-parametric correlations between ORP and academics' pay scale:

Correlations				
			ORP_SCORE	Pay grade in Rupees/month
Kendall's tau_b	ORP	Correlation Coefficient	1.000	.387**
		Sig. (2-tailed)	.	.000
		N	307	307
	Pay grade in Rupees/month	Correlation Coefficient	.387**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
Spearman's rho	ORP	Correlation Coefficient	1.000	.502**
		Sig. (2-tailed)	.	.000
		N	307	307
	Pay grade in Rupees/month	Correlation Coefficient	.502**	1.000
		Sig. (2-tailed)	.000	.
		N	307	307
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 70: Non- parametric correlations between ORP and % of the various duties:

	% of duties	Test	Correlation Coefficient	Sig at	N
ORP	% of teaching	Kendall's tau_b	-.117**	0.001	307
		Spearman's rho	-.162**	0.001	
	% of Research	Kendall's tau_b	.240**	0.001	
		Spearman's rho	.332**	0.001	
	% of paperwork	Kendall's tau_b	.158	Not Sig.	
		Spearman's rho	.086	Not Sig.	
		Kendall's tau_b	-.014	Not Sig.	

	% of student monitoring	Spearman's rho	-.020	Not Sig.	
	% of other duties	Kendall's tau_b	-.014	Not Sig.	
		Spearman's rho	-.021	Not Sig.	

Table 71: Non- parametric correlations between ORP and the working hours/day:

Correlations				
			ORP	Working hours per day
Kendall's tau_b	ORP	Correlation Coefficient	1.000	.117**
		Sig. (2-tailed)	.	.008
		N	307	307
	Working hours per day	Correlation Coefficient	.117**	1.000
		Sig. (2-tailed)	.008	.
		N	307	307
Spearman's rho	ORP	Correlation Coefficient	1.000	.154**
		Sig. (2-tailed)	.	.007
		N	307	307
	Working hours per day	Correlation Coefficient	.154**	1.000
		Sig. (2-tailed)	.007	.
		N	307	307
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 72: Total Variance Explained after deleting nine variables:

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.801	16.113	16.113	5.801	16.113	16.113
2	3.847	10.686	26.799	3.847	10.686	26.799
3	1.803	5.009	31.807	1.803	5.009	31.807
4	1.721	4.780	36.587	1.721	4.780	36.587
5	1.610	4.472	41.059	1.610	4.472	41.059
6	1.522	4.228	45.287	1.522	4.228	45.287
7	1.259	3.498	48.784	1.259	3.498	48.784
8	1.202	3.340	52.124	1.202	3.340	52.124
9	1.174	3.260	55.385	1.174	3.260	55.385

10	1.076	2.989	58.374	1.076	2.989	58.374
11	1.023	2.841	61.215	1.023	2.841	61.215
12	.992	2.757	63.972			
13	.893	2.479	66.451			
14	.842	2.338	68.790			
15	.817	2.271	71.060			
16	.782	2.172	73.233			
17	.740	2.056	75.288			
18	.720	2.000	77.288			
19	.663	1.843	79.131			
20	.639	1.775	80.906			
21	.594	1.651	82.557			
22	.585	1.625	84.182			
23	.562	1.561	85.743			
24	.547	1.519	87.263			
25	.527	1.464	88.727			
26	.493	1.370	90.097			
27	.453	1.257	91.355			
28	.436	1.210	92.564			
29	.400	1.112	93.676			
30	.383	1.064	94.741			
31	.374	1.038	95.779			
32	.355	.985	96.763			
33	.339	.942	97.705			
34	.290	.805	98.510			
35	.288	.801	99.311			
36	.248	.689	100.000			
Extraction Method: Principal Component Analysis.						

Table 73: Final rotated component matrix:

No.		**Rotated Component Matrix[a]**						
	F		Component					
			1	2	3	4	5	6
1	**F1.1**	There has been a significant increase in the workload for the faculty	.740					
2	**F1.2**	The quality of the students entering engineering colleges has dropped noticeably	.605					
3	**F1.3**	Faculties have to undertake more and more administrative (Paperwork) duties these days	.600					
4	**F1.4**	Academia is becoming a less attractive career.	.582					
5	**F1.5**	My teaching workload prevents me from conducting research	.564					
6	**F1.6**	The colleges are more focussed on student results -negatively impacting on the faculty's research	.520					
7	**F2.1**	There are a some engineering colleges in Coimbatore which should not have been accredited at all		.659				

8	**F2.2**	The checks to counteract the malpractices in the colleges are largely ineffective		.659				
9	**F2.3**	Corruption has found its way into academic research		.654				
10	**F2.4**	Unfortunately it is becoming common that academics are buying research work rather to conducting it themselves		.594				
11	**F2.5**	The colleges are less driven by social and moral responsibilities		.559				
12	**F2.6**	The governing bodies have less concern about the quality of research from the Affiliated colleges		.531				
13	**F3.1**	I am motivated by the belief that conducting research will earn me divine merit (Punniyam) for my next life.			.757			
14	**F3.2**	I consider it is my moral duty (Dharma) to conduct research.			.739			
15	**F3.3**	Being of service to others/ use to the society is the prime motivator for me to conduct research			.678			
16	**F3.4**	To me, being in academia to teach and to conduct research is a God given duty/destiny			.517			
17	**F3.5**	Being a role model to the society/others is very important for me			.500			
18	**F4.1**	I am stimulated by the research works. of my colleagues				.677		
19	**F4.2**	In general, I am strongly motivated by the recognition I get from other people				.581		
20	**F4.3**	My job is secure enough for me to focus on research				.580		
21	**F4.4**	The college encourages and cares about the faculty's research works (Financially and morally)				.570		
22	**F4.5**	My colleagues and I regularly discuss about each other's research topics				.536		
23	**F5.1**	It is important that I have a real interest in the research I am carrying out.					.762	
24	**F5.2**	Conducting research activities is very enjoyable for me					.753	
25	**F5.3**	I am conducting research so that my career will progress to the next level					.527	
26	**F5.4**	I am confident in my skills of using research tools and software					.518	
27	**F5.5**	Curiosity is the driving force behind me conducting research					.494	
28	**F6.1**	I receive no / little support for attending FDPs (Faculty Development Programmes) to improve my research skills						.770
29	**F6.2**	I receive no / little on-duty facility or flexible teaching hours to support my research activities						.761
30	**F6.3**	The colleges in general lack vision for the lecturers' development and their research						.589

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 9 iterations.

Source: Author.

Table 74: Frequency distribution of the EoRP:

Freq	UG_Supervision	PG_Supervision	PhD_Supervision	First_auth_nat_conf	Co_auth_nat_conf	First_auth_internat_c	Co_auth_internat_co	First_auth_Books	Co_auth_Books	First_auth_chapters	Co_auth_chapters	First_auth_patents	Co_auth_patents	No_of_national_pape rs_as_first_author	No_of_national_pape rs_as_co_author	No_of_Internat_pape r_as_first_author	No_of_Internat_pape r_as_Co_author
0	71	186	298	87	155	86	153	301	302	302	301	301	304	219	244	162	216
1	19	23	3	57	50	80	56	3	1	0	1	3		0	1	0	0
2	29	29	1	47	23	51	29	0	1	1	1			0	1	0	1
3	24	7	0	24	17	22	13	0	1					3	1	1	9
4	32	16	2	11	5	10	3	0						0	2	0	1
5	20	14	1	20	6	3	6	0						0	0	0	0
6	16	4	0	10	5	4	1	1						0	1	1	4
7	9	4	0	0	1	1	0							0	4	0	18
8	8	6	1	0	0	2	2							0	0	0	0
9	2	2	1	1	0	0								0	0	9	1
10	22	8		1	0	2								0	0	0	0
11	1	1		0	1	0								0	0	0	0
12	5	5		1		1								0	0	0	1
13	5	0		1		0								0	0	0	0
14	4	0		1		0								0	2	0	7
15	15	1		1		0								1	0	3	0
16	2	1		0		0								0	0	0	0
17	0			0		1								0	0	0	0
18	1			0										1	0	0	0
19	0			0										0	0	0	0
20	8			0										0	0	0	0
21	0			0										3	2	16	10
22	0			0												0	0
23	0			0												0	0
24	2			0												0	0
25	7			1												0	0
26	0															0	0
27	0															1	0

28	0															0	4
29	0															0	0
30	4															0	0
31	0															0	0
32	0															0	0
33	0															0	0
34	0															0	0
35	0															0	6
36	0															0	0
37	0															0	0
38	0															0	0
39	0															0	0
40	0															0	0
41	0															0	0
42	0															6	3
43	1																

Source: Author.

Table 75: Print screen of the Tobit model for OSS:

overall_supervision_s~e	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
fac1_1	-.3418356	.7754487	-0.44	0.660	-1.868146	1.184475
fac2_1	-.1355544	.7516083	-0.18	0.857	-1.61494	1.343831
fac3_1	-1.623747	.7598016	-2.14	0.033	-3.11926	-.1282349
fac4_1	.3667707	.7832753	0.47	0.640	-1.174945	1.908486
fac5_1	-.1937718	.6538785	-0.30	0.767	-1.480796	1.093253
fac6_1	1.201555	.8401584	1.43	0.154	-.4521229	2.855234
male	4.597054	1.888849	2.43	0.016	.8792457	8.314863
n_less_35	-2.59535	5.227276	-0.50	0.620	-12.88416	7.693462
n_35_45	3.294226	5.249487	0.63	0.531	-7.038305	13.62676
n_age_ins_less10	-3.566162	1.640471	-2.17	0.031	-6.795091	-.3372331
n_position_juior	8.364587	4.43857	1.88	0.061	-.3718199	17.10099
n_ict	9.605521	2.381407	4.03	0.000	4.918213	14.29283
n_others	1.085508	4.014789	0.27	0.787	-6.816773	8.987789
n_circuit	6.027336	1.935266	3.11	0.002	2.218165	9.836507
n_exp_less10	-9.864041	3.182839	-3.10	0.002	-16.1288	-3.599282
n_pay_less35k	-20.081	2.929464	-6.85	0.000	-25.84705	-14.31496
n_pay_135k_45k	-12.70978	4.293724	-2.96	0.003	-21.16109	-4.258476
yes_ind_exp	.0703455	1.730578	0.04	0.968	-3.335939	3.47663
n_wrkhrs_day_less7_5hrs	-2.079288	1.788708	-1.16	0.246	-5.59999	1.441415
n_tchhrs_week_less14hrs	-1.930266	1.938149	-1.00	0.320	-5.745112	1.884579
n_res_less20km	2.962853	1.60725	1.84	0.066	-.2006864	6.126393
_cons	20.94195	6.163957	3.40	0.001	8.809474	33.07442
/sigma	12.37475	.6306425			11.13346	13.61604

Table 76: Print screen of the Tobit model for OCS:

overall_conference_sc~e	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
fac1_1	-.7283737	1.46915	-0.50	0.620	-3.620092	2.163344
fac2_1	2.145166	1.531309	1.40	0.162	-.8688984	5.159231
fac3_1	-3.23765	1.533555	-2.11	0.036	-6.256135	-.2191643
fac4_1	-.4078651	1.261363	-0.32	0.747	-2.890597	2.074867
fac5_1	-2.34527	1.396343	-1.68	0.094	-5.093683	.4031431
fac6_1	-1.891178	1.709701	-1.11	0.270	-5.256371	1.474015
male	.7482281	3.27932	0.23	0.820	-5.706435	7.202891
n_less_35	3.50368	9.047825	0.39	0.699	-14.30509	21.31245
n_35_45	11.25149	9.517222	1.18	0.238	-7.481199	29.98417
n_age_ins_less10	-.3384742	2.818096	-0.12	0.904	-5.885313	5.208365
n_position_juior	9.68518	8.590191	1.13	0.260	-7.222835	26.5932
n_ict	11.44608	4.375476	2.62	0.009	2.83386	20.0583
n_others	-7.939863	6.23557	-1.27	0.204	-20.21329	4.333566
n_circuit	8.889305	3.551824	2.50	0.013	1.898273	15.88034
n_exp_less10	-11.58027	6.299903	-1.84	0.067	-23.98033	.8197834
n_pay_less35k	-15.44511	5.392959	-2.86	0.004	-26.06004	-4.830188
n_pay_l35k_45k	-2.183418	8.286164	-0.26	0.792	-18.49302	14.12618
yes_ind_exp	-3.975934	3.264035	-1.22	0.224	-10.40051	2.448643
n_wrkhrs_day_less7_5hrs	-5.790007	3.150706	-1.84	0.067	-11.99152	.4115059
n_tchhrs_week_less14hrs	7.06391	3.726696	1.90	0.059	-.27132	14.39914
n_res_less20km	.0718826	2.783422	0.03	0.979	-5.406708	5.550473
_cons	26.8525	11.58909	2.32	0.021	4.041781	49.66322
/sigma	23.53478	1.587101			20.4109	26.65866

Table 77: Print screen of the Tobit model for OPS:

overall_paper_score	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
fac1_1	-1.959232	2.39676	-0.82	0.414	-6.676759	2.758296
fac2_1	4.354077	2.225002	1.96	0.051	-.025379	8.733532
fac3_1	-3.916494	2.261998	-1.73	0.084	-8.368769	.5357807
fac4_1	1.594466	2.211477	0.72	0.472	-2.75837	5.947302
fac5_1	-5.114194	2.22284	-2.30	0.022	-9.489396	-.7389929
fac6_1	.0151181	2.401149	0.01	0.995	-4.711047	4.741283
male	9.308906	5.188896	1.79	0.074	-.9043626	19.52218
n_less_35	12.84624	14.63714	0.88	0.381	-15.96394	41.65643
n_35_45	9.822806	13.88066	0.71	0.480	-17.4984	37.14401
n_age_ins_less10	2.258182	4.797632	0.47	0.638	-7.184966	11.70133
n_position_juior	4.051944	10.73998	0.38	0.706	-17.08748	25.19137
n_ict	28.11772	7.085065	3.97	0.000	14.17223	42.0632
n_others	7.562648	8.77395	0.86	0.389	-9.707058	24.83235
n_circuit	21.12557	5.801149	3.64	0.000	9.707211	32.54393
n_exp_less10	-24.93401	8.905709	-2.80	0.005	-42.46306	-7.404964
n_pay_less35k	-22.94335	7.493772	-3.06	0.002	-37.69329	-8.193411
n_pay_l35k_45k	-1.761151	10.6612	-0.17	0.869	-22.74552	19.22321
yes_ind_exp	5.742434	4.877569	1.18	0.240	-3.858052	15.34292
n_wrkhrs_day_less7_5hrs	-8.088042	4.890201	-1.65	0.099	-17.71339	1.537307
n_tchhrs_week_less14hrs	4.61355	5.080791	0.91	0.365	-5.386937	14.61404
n_res_less20km	5.631862	4.499784	1.25	0.212	-3.225033	14.48876
_cons	4.768927	14.85712	0.32	0.748	-24.47424	34.0121
/sigma	34.41193	2.324198			29.83723	38.98664

Table. 78: Sampling of the institutions based on their age and no. of staff:

Sampling based on age of Institution - one per year started and trying to select institutions of similar size where possible (7 with more than 100 and 7 with 50 or less)

ID	Name	Yr. starting	Age of insti.	No. of staff	No. of PhDs	Pursuing		20%	Sample
1	Sri Ramakrishna Engineering College	1994	21	246	17		1	49.2	49
3	Park College of Engineering Technology	1997	18	144	8		2	28.8	29
5	Hindusthan College of Engineering and Technology	2000	15	194	17		3	38.8	39
6	Coimbatore Institute of Engineering and Information Technology	2001	14	225	20		4	45	45
8	Sri Ramakrishna Institute of Technology	2002	13	146	23		5	29.2	29
10	Sri Shakthi Institute of Engineering and Technology	2006	9	135	18		6	27	27
12	Dr. N.G.P. Institute of Technology	2007	8	182	31		7	36.4	36
31	Tejaa Shakthi Institute of Technology for Women	2008	7	51	1		8	10.2	10
38	Park College of Technology	2009	6	26	1		9	5.2	5
44	Christ The King Engineering College	2010	5	48	0		10	9.6	10
46	Rathinam Technical Campus	2011	4	38	4	4	11	7.6	8
50	Suguna College of Engineering	2012	3	30	0		12	6	6
54	Dhaanish Ahmed Institute of Technology	2013	2	12	0		13	2.4	2
56	PSG institute of tech and applied resarch	2014	1	27	14		14	5.4	5
			Total staff population	**1504**					**300**
			% of sample population	**20%**					
			Target sample size for PhD survey	**300**					

Source: Author, based on the mandatory disclosures of the institutions.

Table. 79: Influence of the interaction between Gender and Experience on ORP:

Gender * Teaching experience in years

Dependent Variable: OVERALL_RESEARCH_PRODUCTIVITY_SCORE

Gender	Teaching experience in years	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	Less than 5 years	28.059[a]	8.572	11.184	44.934
	5 to 10 years	53.128[a]	12.293	28.926	77.330
	11 to 15 years	92.134[a]	17.106	58.456	125.812
	16 to 20 years	148.521[a]	21.622	105.953	191.089
	more than 20 years	131.813[a]	22.934	86.662	176.963
Female	Less than 5 years	38.531[a]	8.272	22.245	54.816
	5 to 10 years	92.842[a]	13.405	66.450	119.233
	11 to 15 years	90.514[a]	18.725	53.649	127.379
	16 to 20 years	105.688[a]	32.433	41.835	169.540
	more than 20 years	166.250[a]	45.868	75.949	256.551

a. Based on modified population marginal mean.

Table. 80: Influence of the interaction between age group and marital status on ORP:

Age group in years * Marital status

Dependent Variable: OVERALL_RESEARCH_PRODUCTIVITY_SCORE

Age group in years	Marital status	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
less than 25 yrs	Single	33.225[a]	16.350	1.036	65.414
	Married	49.917[a]	20.936	8.700	91.133
25 to 35 yrs old	Single	43.180[a]	5.855	31.654	54.707
	Married	65.616[a]	8.438	49.003	82.229
35 to 45 yrs old	Single	60.250[a]	45.868	-30.051	150.551
	Married	110.063[a]	10.482	89.428	130.699
45 to 55 yrs old	Single	.[b]	.	.	.
	Married	100.212[a]	15.914	68.882	131.541
55 yrs and older	Single	.[b]	.	.	.
	Married	112.625[a]	24.174	65.032	160.218

a. Based on modified population marginal mean.

b. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.

Table. 81: Influence of the interaction between age group and gender on ORP:

Gender * Age group in years

Dependent Variable: OVERALL_RESEARCH_PRODUCTIVITY_SCORE

Gender	Age group in years	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	less than 25 yrs	34.456[a]	19.137	-3.220	72.131
	25 to 35 yrs old	69.244[a]	5.100	59.204	79.283
	35 to 45 yrs old	75.761[a]	12.894	50.377	101.145
	45 to 55 yrs old	92.630[a]	17.516	58.146	127.114
	55 yrs and older	112.625[a]	24.174	65.032	160.218
Female	less than 25 yrs	48.071[a]	14.689	19.151	76.990
	25 to 35 yrs old	47.636[a]	9.700	28.539	66.733
	35 to 45 yrs old	140.487[a]	17.641	105.758	175.217
	45 to 55 yrs old	115.375[a]	32.433	51.523	179.227
	55 yrs and older	.[b]	.	.	.

a. Based on modified population marginal mean.

b. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.

Table. 82: Influence of the interaction between age group and gender on ORP:

Gender * Marital status * Teaching experience in years

Dependent Variable: OVERALL_RESEARCH_PRODUCTIVITY_SCORE

Gender	Marital status	Teaching experience in years	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Male	Single	Less than 5 years	31.098[a]	6.610	18.086	44.111
		5 to 10 years	56.757[a]	21.905	13.632	99.882
		11 to 15 years	.[b]	.	.	.
		16 to 20 years	.[b]	.	.	.
		more than 20 years	.[b]	.	.	.
	Married	Less than 5 years	26.033[a]	13.589	-.720	52.787
		5 to 10 years	49.499[a]	11.166	27.516	71.481
		11 to 15 years	92.134[a]	17.106	58.456	125.812
		16 to 20 years	148.521[a]	21.622	105.953	191.089
		more than 20 years	131.813[a]	22.934	86.662	176.963
Female	Single	Less than 5 years	26.675[a]	8.690	9.566	43.784
		5 to 10 years	46.828[a]	16.217	14.902	78.754
		11 to 15 years	.[b]	.	.	.
		16 to 20 years	.[b]	.	.	.
		more than 20 years	.[b]	.	.	.
	Married	Less than 5 years	50.387[a]	14.078	22.671	78.102

	5 to 10 years	108.180[a]	17.037	74.639	141.720
	11 to 15 years	90.514[a]	18.725	53.649	127.379
	16 to 20 years	105.688[a]	32.433	41.835	169.540
	more than 20 years	166.250[a]	45.868	75.949	256.551

a. Based on modified population marginal mean.

b. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.

Table. 83: Influence of the interaction between Gender and age group on ORP:

Category	Male Frequency	Female Frequency	Sig. Value	K-W test Result
Less than 25 Yrs.	18	16	0.851	Not Sig.
25-25 Yrs.	142	74	0.849	Not Sig.
35-45 Yrs.	30	13	0.202	Not Sig.
45 to 55 Yrs.	8	2	0.364	Not Sig.
More than 55 Yrs.	4	NA	NA	NA

Table. 84: Influence of the interaction between Gender and marital status on ORP:

Category	Male **Mean** ORP	Female **Mean** ORP	Male **Median** ORP	Female **Median** ORP	**Sig. Value**	**K-W test Result**
Single	39.6	31.16	25.50	25.25	0.764	Not sig.
Married	71.22	64.6	55.50	47.00	0.535	Not sig.

Table 85: K-W test of difference of ORP between genders of different marital status:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of OVERALL_RESEARCH_PRODUCTIVITY_SCORE is the same across categories of Gender_Marital.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table 86: Strengths and weakness of probability and non-probability sampling:

	Probability sampling	**Non-probability sampling**
Exploratory research	Weakness	Strength
Specific people/elements of the population needs targeting	Weakness	Strength
Require a representative sample	Strength	Weakness
Required to minimize selection bias	Strength	Weakness
Required to make statistical inferences	Strength	Weakness
Research aims to provide illustrative examples	Weakness	Strength
Homogeneous population	Weakness	Strength
Difficult to gain access population	Weakness	Strength
Limited time and money	Weakness	Strength
Skilled and trained personnel	Weakness	Strength
Quantitative research	Strength	Weakness
Large sample size required	Strength	Weakness
Qualitative research design	Weakness	Strength

Source Author, based on Trochim et al. (2015), Lim and Ting (2012), Dhivyadeepa (2015) and De Vaus (2013)

Appendix 6: Quantitative questionnaire

Research project on

Motivation to conduct research in a rapidly evolving academic environment:

Study of Coimbatore's engineering institutions

Dear Sir/Madam,
I am Venkat Bakthavatchaalam, a PhD student at the Plymouth University, UK, having completed my U.G. in Coimbatore. My research is about developing an indigenous model of academic motivation for the Indian academics to increase their research productivity. This questionnaire is designed to collect information about the various determinants that motivate, impede the academics in the Engineering institutions of Coimbatore to conduct research.
Please note that all the responses will be treated with the strictest confidence, according to the ethical policy of the Plymouth University. The data will be used for research purposes only. Your personal information will not be disclosed at any time. Participation in the research is completely voluntary and you have the right to withdraw whenever you wish.
This survey will take you approximately 12 to 13 minutes. I am aware how important your time is. As your thoughts on this research are essential, I would be most grateful if you could spare your time to complete this questionnaire. If you wish to have a copy of the results, please contact the author in the below mail id.
Yours sincerely,

Venkat Bakthavatchaalam,

PhD student,

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Section 1: Demographic details

Please tick (√) the option that best describes you.

1. Gender:

Female	Male

2. What is your age group:

Less than 25	25-35	36-45	46-55	56 and above

3. Marital status:

Single	Married	Divorced / widowed	Do not wish to say / disclose

4. What type of institution do you work in:

Affiliated institution	Autonomous institution	Deemed University	University campus	Other (Please specify) ……

5. What is the age of your institution:

Less than 5 years	5 - 10 years	11 - 15 years	16 - 20 years	More than 20 years

6. What is your position in the institution:

Assistant Professor	Associate Professor	Professor	Head of the Department /Dean	Principal	Other (Please specify ……

7. Please write the department you work for: (eg. Mech. Engg.,)……

8. How long have you been teaching for (Total teaching experience):

Less than 5 years	5 - 10 years	11 - 15 years	16 - 20 years	More than 20 years

9. What is your pay range per month:

Less than Rs. 25,000	Rs. 25,000 – 35, 000	Rs. 35,000 – 45,000	Rs. 45,000 – 55,000	Rs. 55,000 – 65,000	More than Rs. 65,000

10. Have you been working in industry before teaching: Yes No

11. Did you graduate one or more of your degrees abroad Yes No

12. How much of your time is divided among the following roles:

a.	Teaching	____ %
b.	Research	____ %

c.	Paper work	____ %
d.	Student monitoring/mentoring	____ %
e.	Other duties *(Organising events, additional work…)*	____ %
Total		100%

13. Please make a tick (√) for the highest qualification you have achieved and (If you are) working towards:

Highest degree	**Achieved**	**Working towards (If you are)**
Under-Graduation (UG)		
Post-Graduation (PG)		
M.Phil.		
PhD		

14. On an average, what is your number of working hours (Hrs.) per day?

Less than 6 hrs.	6 to 7.5 hrs.	7.5 to 8.5 hrs.	More than 8.5 hrs.

15. On an average, what is your number of teaching related hours **per week**? (Preparation for lectures, teaching, marking…)

Less than 7 hrs.	7 to 14 hrs.	15 to 23 hrs.	More than 23 hrs.

16. How far do you live from the institution campus?

In the campus	Within 5 Km radius from the campus	Within 20 Km radius from the campus	More than 20 Km radius from the campus

Section 2: Motivators and barriers to research productivity

Please make a tick (√) for the most appropriate option for the following statements

No.	Statement	Strongly agree	Agree	Disagree	Strongly disagree	Not applicable
Personal factors						
1	Curiosity is the driving force behind me conducting research					
2	I enjoy simple and straightforward tasks more than the challenging ones					
3	Conducting research activities is very enjoyable for me					
4	It is important that I have a real interest in the research I am carrying out.					
5	I am confident in my skills of using research tools and software					
6	I prefer to teach rather to conduct research					
7	I doubt if I will ever be able to conduct high quality research					
Professional factors						

8	I am conducting research so that my career will progress to the next level					
9	In general, I am strongly motivated by the money I can earn					
10	I will not waste time conducting research – if it does not lead to promotion					
11	My job is secure enough for me to focus on research					
12	In general, I am strongly motivated by the recognition I get from other people					
13	My teaching workload prevents me from conducting research					
No.	**Statement**	**Strongly**	**Agree**	**Disagree**	**Strongly disagree**	**Not applicable**
Organisational factors:						
14	The colleges are more focussed on student results - negatively impacting on the faculty's research					
15	The college encourages and cares about the faculty's research works (Financially and morally					
16	I receive no / little on-duty facility or flexible teaching hours to support my research activities					
17	I receive no / little support for attending FDPs *(Faculty Development Programmes)* to improve my research skills					
18	My colleagues and I regularly discuss about each other's research topics					
19	The colleges in general lack vision for the lecturers' development and their research					
20	The library and the lab facilities in the college are adequate for me to conduct research					
21	I am stimulated by the research works. of my colleagues					

Changing academic environment:						
22	The quality of the students entering engineering colleges has dropped noticeably					
23	Academia is becoming a less attractive career.					
24	There has been a significant increase in the workload for the faculty					
25	Faculties have to undertake more and more administrative (Paperwork) duties these days					
26	The colleges are becoming more and more into a money making machine					
27	The colleges are less driven by social and moral responsibilities					
No.	**Statement**	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**	**Not applicable**
Governing/External bodies (AICTE, UGC, University commissions)						
28	There is a lack of public expenditure on research					
29	The governing bodies have less concern about the quality of research from the affiliated colleges					
30	There are too few industry-academia links					
31	There are a some engineering colleges in Coimbatore which should not have been accredited at all					
32	The checks to counteract the malpractices in the colleges are largely ineffective					
Indigenous factors:						

33	I consider it is my moral duty (Dharma) to conduct research.					
34	Being of service to others/ use to the society is the prime motivator for me to conduct research					
35	I am motivated by the belief that conducting research will earn me divine merit (Punniyam) for my next life.					
36	Being a role model to the society/others is very important for me					
37	As long as I get my PhD, Promotion, or better opportunity; I don't really care if people use my research or not					
38	There is a shortage in the number of guides / supervisors for conducting PhD and further research					
No.	**Statement**	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**	**Not applicable**
39	The psychological satisfaction I get out of research motivates me more than the monitory/materialistic rewards it can bring					
40	To me, being in academia to teach and to conduct research is a God given duty/destiny					
41	More than my own abilities, it is because of God's grace that I have achieved so far					
42	Corruption has found its way into academic research					
43	Unfortunately it is becoming common that academics are buying research work rather to conducting it themselves					
44	Delays in research process are inevitable and acceptable					
45	I consider 'Auspicious time', 'Astrology' and/or 'Vaastu Saastram' (Architectural codes) to be of importance while making decisions about the research.					
46	If I am conducting my PhD or research, I might have a better husband/wife					

Section 3: Research Productivity

Please write the appropriate number (No.) of project supervision, papers and books written etc. in the boxes below.

No.	In the last 5 years	No. I have written /supervised /authored	Of which I am the first author	Of which I am the co-author
1	The no. of Under- Graduate projects supervised			
2	The no. of Post- Graduate projects supervised			
3	The no. of PhD thesis supervising / supervised			
No.	**In the last 5 years**	**No. I have written /authored**	**Of which I am the first author**	**Of which I am the co-author**
4	The no. of national conferences attended			
5	The no. of International conferences attended			
6	The no. of papers published in **national level Annexure 2 journals**			

7	The no. of papers published in **national level Annexure 1 journals**			
8	The no. of papers published in **international level Annexure 2 journals**			
9	The no. of papers published in **international level Annexure 1 journals**			
10	The no. of books written/edited			
11	The no. of chapters authored in books			
12	The no. of patents registered			

13. I collaborate with international academics

a. On a regular basis
b. I choose to work with academics within India.

Please include if you have any comments or suggestions:

Thank you for sparing your valuable time to fill out the questionnaire.

Thank you once again for your help.

Appendix 7: Interview questions

RESEARCH WITH PLYMOUTH UNIVERSITY

Interview number: _____

Research title:
Motivation to conduct research in rapidly evolving academic environment: Study of Coimbatore's engineering institutions

I agree to take part in this research project. I have had the research explained to me. I understand that agreeing to take part means that I am willing to:

1. Be interviewed by the researcher
2. Allow the interviewer to audio record the conversation

This information will be accessed and analysed by the researcher only.
I understand that all the information I provide is confidential and that no information that could lead to identification of any individual will be disclosed in any reports on the research or to any other third-party. No identifiable data will be shared with any other organisations.
I understand that I will be given the recorded audio transcript and a copy of the notes the interviewer has written down concerning my interview for my approval before it is included for the analysis of the research.
I also understand that my participation is voluntary and that I can choose not to be a part of the research either wholly or partially and that I can withdraw from the research without further explanation anytime by sending a mail to the researcher: Venkat.bakthavatchaalam@plymouth.ac.uk

Name: (Please write in block letters) _____
Signature: _____
Date: _____
Interview with the participants
Interview number: _____
Explanation of the research
Sign the consent

No.	To cover	Tick
1	**why** do you think that factors like 'Being of service', 'Moral duty', 'God given duty', 'Role model' and 'Devine merit (Punniyam)' important for Overall Research Productivity (ORP)?	
2	**How important** and **how** do you think the indigenous factors influence the ORP of academics?	
3	**Why** do academics perceive there is Academic Dishonesty (AD)?	
4	**How** does AD influence the ORP of the academics	
5	**How** to decrease AD at different levels?	
6	**Has** and **how has** the new ranking system of the Ministry of HR Development of India (MHRD) created a need to conduct research?	
7	**What** are the changes at different levels that should be made to increase the ORP?	
8	**How** does the institution motivate the academics to increase their ORP? - Does it work?	
9	Should the institution do anything in particular to increase the ORP of academics?	
10	Do you think that engineering academics in Coimbatore consider conducting research is important?	

Is there any other thing you would like to include regarding the above?

Thank you

Other information: Do you know any other academic who I might be able to contact for the research?

Appendix 8: Details of the methodology

A8.1: Introduction:

In chapter 3 (methodology), the research philosophy, ontology, epistemology and the methodologies have been summarised and have been more personalised to the current research. This appendix presents the details that were summarised.
Details on the Research methodology:

A8.2 Research Philosophy:

(Easterby-Smith et al., 2012). comment that an appropriate research philosophy:

2. Gives the researcher an early idea on the type of evidence that is required and the ways of collecting and interpreting data
3. Enables the researcher to classify various research designs and to know the advantages and the limitations of the chosen design thus letting the researcher identify designs that might or might not work, so not being led into blind alleys in terms of research
4. Enables the researcher to identify, use and create designs that are new to their experience.

Research can be classified as being scientific and social (McNeill, 2005). The scientific researchers are very objective and consider that the world is theory neutral and is external to the observation. The social researchers study people and societies and are subjective in their approach and they need to acknowledge that they are a part of the society they are studying. However, they take a scientific attitude for studying the issues, with a systematic, impartial and ethical approach. The subjective approach considers that there is no access to reality beyond what is experienced and that the existence of reality depends on what is being observed (Easterby-Smith et al., 2012).

This is a social research. A social research is not just a descriptive fact gathering exercise, but as Blaikie (2007) describes social research is an act of exploring, describing, understanding, explaining, predicting, changing or evaluating some aspect

of the social world. Even more broadly, social research is conducted to know what is happening, why is it happening and how it affects people (Hall, 1996).

A8.3 Ontology:

Ontology according to Easterby-Smith et al. (2012) is the point where the debate of most research philosophers starts.

The ontology explains parameters such as perceptions, assumptions about the nature of reality, beliefs etc. as they influence how the research is conducted. The various types of ontological stance in social science and their view points are:

6. Realism: Truth can be known by verifying the predictions. Facts are concrete and are to be accessed indirectly. Realism in principle, acknowledges that people and the behaviour of the society are influenced (either constrained or enhanced) by the various social structures and the mechanisms within that structure. The social structures (which might not be directly observable) may be based on the religion, the economy, education, different economic classes of people and how these different bases interact with each other. Critically looking at it, there is always a question of the nature of reality and how it exists and if it can be accessed independently of the observer and our ability to describe it (McNeill, 2005).
7. Relativism: Truth is determined by integrating various viewpoints and finding a common consent. Facts are dependent on how the observer views the phenomenon (Newman and Benz, 1998). Relativists take the view point that knowledge is a result of and comes from an iterative point of view or an evolved perspective. They further argue that the external world exists only insofar as the observer and their perception and how the observer constructs it (Blaikie, 2007).
8. Nominalism: According to this ontological stance, truth or reality depends on who it is established by and that facts are all created by humans (Easterby-Smith et al., 2012)

The importance of having a clear idea of ontology is because the same phenomenon can be observed from either of the above ontological positions and can be interpreted

differently which might lead to different results based on the stance adopted by the researcher (Blaikie, 2007, McNeill, 2005).

A8.4 Epistemology:

Epistemology focuses on how to know what exists and what are the various elements that should be satisfied in order for something to be expressed as knowledge? (Blaikie, 2007), how do we know things? How do we discover knowledge etc., either objectively or subjectively? In other words, what the researcher believes about the nature of reality will dictate how the researcher thinks s/he is to discover knowledge (Killiam, 2013).
On the whole, epistemology can be stated to be a set of assumptions on the best ways of inquiring into the nature of the world (Easterby-Smith et al., 2012). When a particular epistemology is chosen, it results in the researcher adopting particular methodologies relevant to that epistemological stand.

A8.4.1 Positivist paradigm:

The positivist paradigm is explained by Comte in Mill (1865) as “There can be no real knowledge but that which is based on observed facts”. Whereas constructionism is based on the belief that verifiable observations are subject to different interpretations and that the work of a researcher is to shed light on the different truths that are being constructed in everyday life (Easterby-Smith et al., 2012).

Overall, positivists view reality existing independently of the observer and the role of the researcher is limited only to identifying this pre-existing reality. A researcher with a positivist paradigm will design experiments and surveys to eliminate any alternative hypothesis. A positivist approach is usually used to measure the quantity and provides a causal relationship between the elements considered.

This paradigm uses quantitative methods for data collection. A positivist paradigm can be used to check an existing theory (Cooper et al., 2012). This stance requires that

the researcher does not influence the research so that an objective measurement can be obtained (Newman and Benz, 1998).

A8.4.2 Constructionist paradigm:

Researchers with a constructionist paradigm rather than assuming pre-existing realities, explore how people construct structures that help them understand a phenomenon and try to understand the 'Why' and 'How' of It (Johnson and Christensen, 2013). This paradigm is used to know/ understand the reasons behind a certain phenomenon and is used to formulate new theories. This paradigm uses qualitative methods to collect data (Cooper et al., 2012). This stance requires the researcher to interact with the subjects/respondents to not only understand the respondents' point of views and their meanings but also to explore how they create meaning out of a situation or experience.

A8.4.3 Combination of paradigms:

When the research becomes complex, both the constructionist and positivist paradigms loses their dichotomy with Halcomb and Hickman (2015) and Cooper et al. (2012) stating that in order to increase the reliability of the data, it is better to collect both quantitative and qualitative data. This is supported by Hall (1996) who comment that rather than using just one approach, a combination of inductive and deductive process should be used to create a comprehensive theory. Table 12 summarises the different epistemologies.

Table 12: Different types of epistemologies:

	Positivism	**Constructionism**
Aims	To discover an already existing phenomenon	Invent a theory to understand /explain a phenomenon.
Starting point	Forming hypothesis	Trying To find meanings

Research techniques	Measurement using numbers and statistics	"Conversation" with participants
Analysis techniques	Verification /falsification of a theory or model	Sense-making of a certain phenomenon
Research outcomes	Causality, equations etc.	Understanding the reasons behind a certain phenomenon or occurrence.
Study	Natural world	Social world
Ideology	Things can be explained by casual relationships (e.g. cause and effect)	Needs complex interaction and casual relationship would be inadequate
Answers	Numeric – How many? How much?	Why? The reasons behind the real causes etc.
Major function	Checks the existing theory	Formulates new theories
Observer	Independent of what is 'Being researched'	Is an integral part of the 'Researched'
Units of analysis	Should be reduced to the simplest terms	Can include the complexity of 'Whole terms'
Sampling	Large no. of samples	Small no. of cases is sufficient

Source: Author, based on Cooper et al. (2012), Easterby-Smith et al. (2012), Cooper et al. (2003) and Nation (1997).

Newman and Benz (1998) comment that there is no hard and fast rule that the researcher should stick to either one or the other epistemologies and that there is no real dichotomy between these. They also suggest that to get a complete view, a combination of these approaches (Egbert and Sanden, 2013) should be used. A mixed approach involves the use of both positivist and constructionist approaches and represents an alternative approach to helping researchers explore a complex phenomenon (Halcomb and Hickman, 2015, Lund, 2012).

A8.5 Methodology:

Methodology is informed by both ontology and epistemology. It is about how knowledge is discovered and analysed in a systematic method (Watkins, 2015, McNeill, 2005).

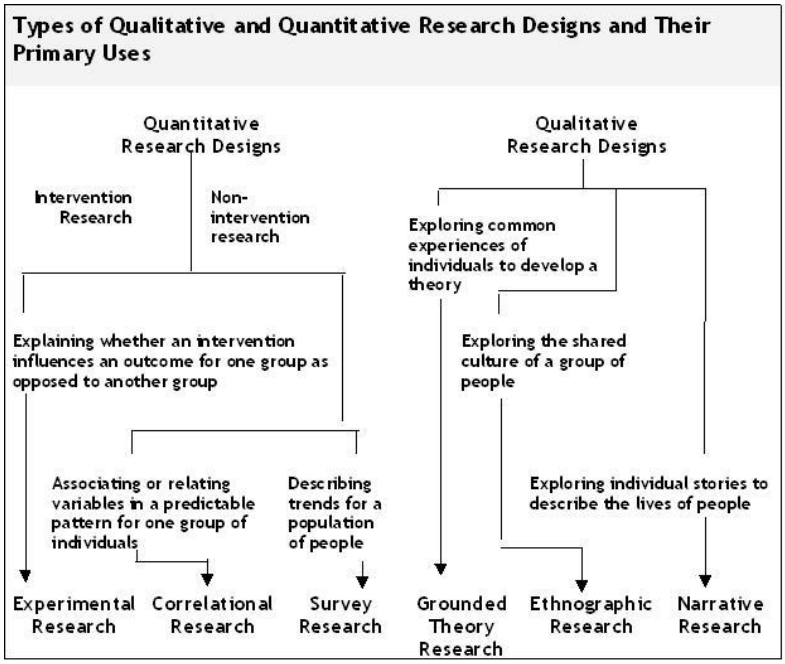
A8.5.1 Aligning the purpose of research with methodologies:

So, it is essential to understand the purpose of the research and to align it with the methodologies. Different purposes demand different approaches to research. For instance, if the research is intended to find out specific issues that have not been explored in detail – an exploratory research would be employed. If the research is just to describe or measure a certain phenomenon without offering any explanation, then a descriptive research can be used. Descriptive study looks at 'What' or 'How much' of the research. If the research intends to go beyond just describing and to know the reasons behind such a phenomenon at a certain time frame, then an analytical approach can be used. When the research rather than just analysing the phenomenon at a certain time and if it can be extended to predict future events then a predictive approach can be used (Halcomb and Hickman, 2015, Watkins, 2015, Egbert and Sanden, 2013).

A8.5.2 Quantitative, Qualitative and Mixed method designs:

Research methods are the means by which data is collected by the researcher based on their chosen epistemological stance. They are tools that are used to answer a particular question or a set of questions. Two of the prominent methods are the quantitative and qualitative methods (Watkins, 2015). As shown in Fig.18 they are generally categorised as one or the other. Usually quantitative methods are associated with positivist and qualitative methods with constructionist epistemologies. In a mixed method approach to collecting data, both quantitative and qualitative methods are used (Watkins, 2015, Williamson, 2006).

Fig.18: Types of research designs:



Source: Creswell and Miller (2000)

A8.5.2.1 Quantitative research:

Quantitative research uses mathematical/ numerical data and has pre-determined questions, conceptual framework and models, whereas qualitative research uses non-numerical data starts generally and gradually builds up the focus (Lodico et al., 2010). A quantitative approach is chosen for verification of a theory whereas qualitative approach is used for the generation of new theories (Abrams, 2009, Punch, 2005, Newman and Benz, 1998). Quantitative methods use a deductive approach which is firmly grounded in facts and observations. It starts with a theory and narrows down to testing or confirming a hypothesis formed based on the theory (Easterby-Smith et al., 2012)

A8.5.2.2 Qualitative research:

In qualitative approach, the central goal is to provide a detailed description of the phenomenon from the target population's point of view along with the researchers' insights (Blaikie, 2009, Blaikie, 2007).

"Qualitative data is a source of well-grounded, rich descriptions and explanations of processes in identifiable local contexts" Miles and Huberman (1994).

They also argue that the qualitative methods are much more suited to study basic human behaviour compared to quantitative methods which just provide a snapshot of the phenomenon at a certain point of time. It offers a bottom-up approach where concepts arise from data with the concepts becoming narrower and clearer as the research progresses.

A8.6 Conclusion:

This appendix details the various epistemologies, ontologies and methodologies etc. which could not be included in chapter 3.

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